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ABSTRACT

This document contains the PMDC Mathematics Tests for grade 1 (53 items) and grade 2 (52 items), plus instructions for administering each. Statistical data are also briefly presented. (MS)

PMDC

Grade 1

September 1975

PROJECT FOR THE MATHEMATICAL DEVELOPMENT

OF CHILDREN

MATHEMATICS TEST: GRADE ONE

Financial support for the Project for the Mathematical Development of Children has been provided by the National Science Foundation: Grant No. PES 74-18106-A03.

TO THE USER

The PMDC Mathematics Test: Grade One was pilot-tested during July 1975. The test was then revised and administered during the first three weeks of September 1975 to 197 students. The test in this packet is the latter test. The user may reproduce any of the materials in this packet without obtaining permission from PMDC. Those persons who use the PMDC Mathematics Test: Grade One are encouraged to share with the PMDC staff their evaluation of the test and the data they collect. Such correspondence should be addressed to:

Dr. Eugene D. Nichols
Florida State University
Tallahassee, Florida 32306

Instructions for administering the test and summaries of pertinent statistical analyses are included in the accompanying Examiner's Manual. More detailed analyses of the data obtained from the 1975 Fall Testing Program reported in PMDC Technical Reports Nos. 2 and 3. Information about these publications may be obtained by writing to the above address.

pmdc

PMDC ARITHMETIC TEST, GRADE 1

STUDENT RESPONSE FORM

STUDENT'S NAME _____ DATE _____

STUDENT'S ID# _____ EXAMINER _____

1

Response	Errors
No Attempt (Correct) ___ to ___	Skip Number Incorrect Order Other

2

Response	Errors
No Attempt (Correct) ___ to ___	Skip Number Incorrect Order Other

3

No. Beans
No Attempt (6)

4

Response
No Attempt (4)

5

Response
No Attempt (9)

6

Response
No Attempt (14)

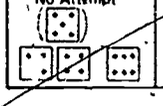
7

Response
No Attempt (Yes) No

8

Response
No Attempt (Animals) Cows Neither/Same Other

9

Response	Method
No Attempt 	Immediate Counted Matched Other

10

Response	Errors
No Attempt (Correct) ___ to ___	Skip Number Incorrect Order Other

11

Response	Errors
No Attempt (Correct) ___ to ___	Skip Number Incorrect Order Other

12

No Beans	Method
No Attempt (Greater than 7)	Counted Matched Gross Other

13

Response	Method
No Attempt (5)	Immediate Counted Other

14

Horses
No Attempt (3)

15

Cows
No Attempt (7)

16

Animals
No Attempt (10)

17

Repeat All
No Attempt (10)

18

Response
No Attempt (Animals) Cows Other

19

Task Completed
Yes No

20

Response
No Attempt (Same) Not-Same

21

Which One?
No Attempt Small Beans Large Beans

22

Response
No Attempt Bean Size One for One Other

23

Response	Errors
No Attempt (Correct) ___ to ___	Skip Number Incorrect Order Other

24

Response	Errors
No Attempt (Correct) ___ to ___	Skip Number Incorrect Order Other

25

Constructed
No Attempt Without Help With Help Incorrectly

26

Response	Method
No Attempt (7)	Immediate Counted Stars Other

27

Response	Method
No Attempt (4)	Immediate Counted Other

28

No Beans	Method
No Attempt (Less than 7)	Counted Matched Gross Other

29

Response	Errors
No Attempt (Correct) ___ to ___	Skip Number Incorrect Order Other

30

Response	Errors
No Attempt (Correct) ___ to ___	Skip Number Incorrect Order Other

31

Response	Method
No Attempt (9)	Immediate Counted 1–9 Counted On Pointed Other

32

Response
No Attempt (4)

33

Response
No Attempt (7)

34

Response
No Attempt (13)

35

Beans (1)
No Attempt (3)

36

Beans (2)
No Attempt (4)

37

Total Beans	Method
No Attempt (7)	Immediate Count Other

38

Square
Yes No

39

Total Beans	Method
No Attempt (7) Other	Immediate Count Other

40

Response	Errors
No Attempt (Correct) ___ to ___	Skip Number Incorrect Order Other

41

Response	Errors
No Attempt (Correct) ___ to ___	Skip Number Incorrect Order Other

42

No Beans	Method
No Attempt (8)	Counted Matched Gross Other

43

Response	Method
No Attempt (2)	Immediate Counted Other

44

Response
No Attempt (40)

45

Method	Response
Immediate Counted by Tens Counted by Ones Other	No Attempt (40)

46

Response	Errors
No Attempt (Correct) ___ to ___	Skip Number Incorrect Order Other

47

Response	Errors
No Attempt (Correct) ___ to ___	Skip Number Incorrect Order Other

48

No Beans	Method
No Attempt (6)	Counted Matched Gross Other

49

Response
No Attempt (4)

50

Response
No Attempt (8)

51

Response
No Attempt (15)

52

No Beans	Method
No Attempt (7)	Counted Matched Gross Other

53

Response
No Attempt (5)

Test Behavior _____ Comments _____

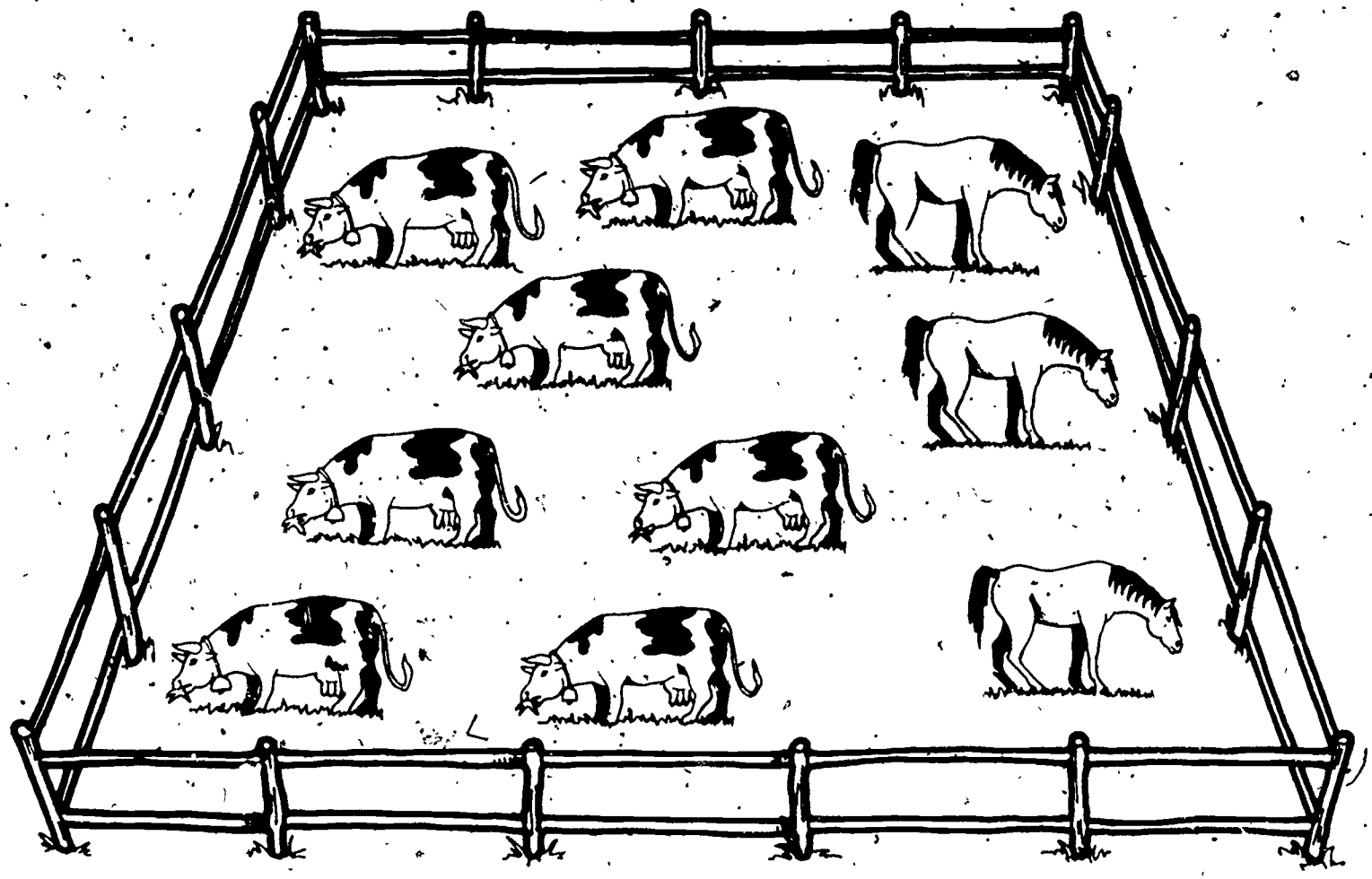
1. Say	COUNT FOR ME. ①
2. If no response, say	I WANT YOU TO COUNT LIKE THIS. ONE, TWO, THREE. NOW YOU DO IT. ②
3. If the student stops before 35, say	THAT'S FINE. KEEP GOING.
4. If the student counts to 35 or makes 2 consecutive errors, say	THAT'S FINE. YOU MAY STOP NOW.

① 11

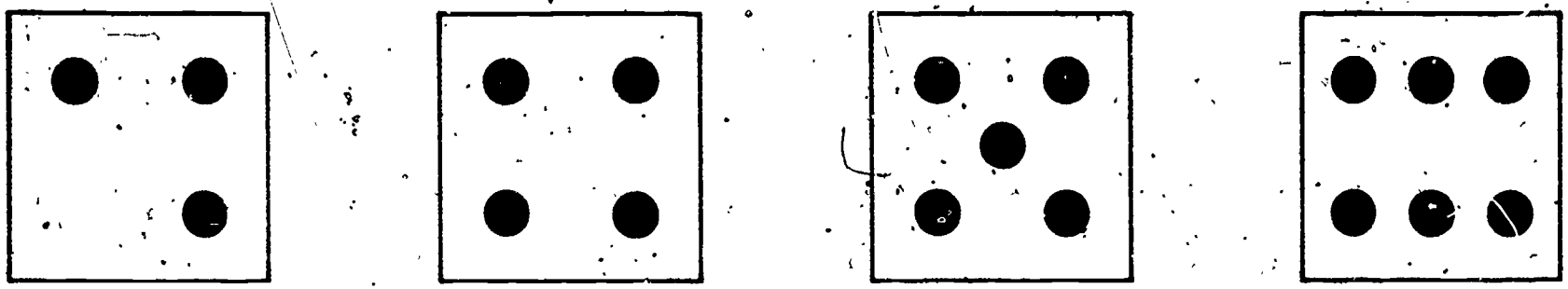
1. Place 50 beans to the student's right. Point to the numeral and say:	MAKE A SET WHICH HAS THIS MANY BEANS. ③

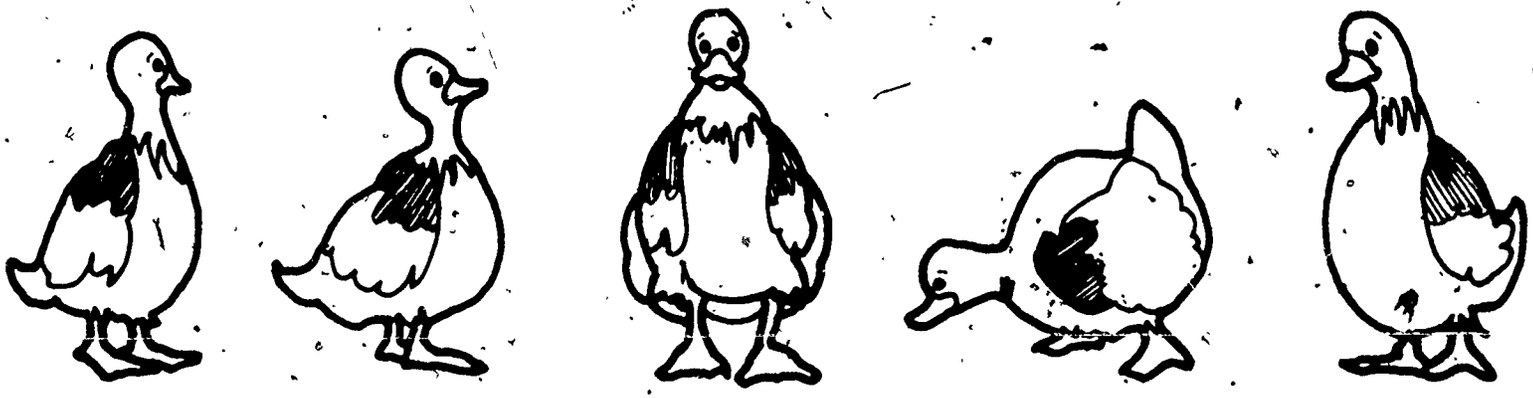
Materials: 50 beans

1. Ask	WHAT NUMBER COMES JUST AFTER 3? ④
2. Ask	WHAT NUMBER COMES JUST AFTER 8? ⑤
3. Ask	WHAT NUMBER COMES JUST AFTER 13? ⑥



1. Point to the picture. Ask (If the student responds "No", do not continue this item.)	ARE ALL THE COWS ANIMALS? ⑦
2. Ask	ARE THERE MORE ANIMALS OR MORE COWS? ⑧



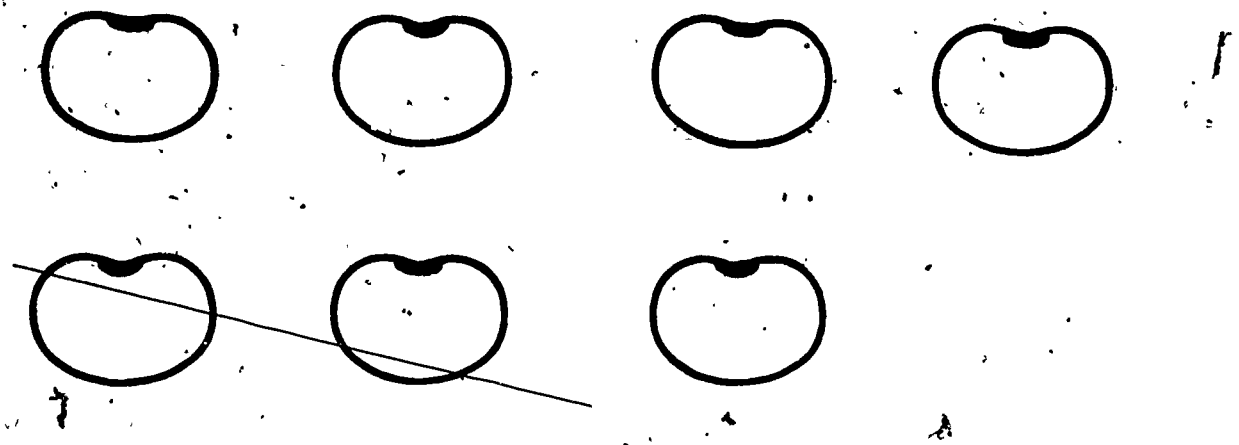


Item 5: Remove this sheet from test booklet and place on table in front of child.

1. Hand the student the card with five ducks. Say	HERE ARE SOME DUCKS.
2. Point to the pictures of dots. Ask	WHICH OF THESE SHOWS HOW MANY DUCKS? ⑨

Materials: Card with 5 ducks.

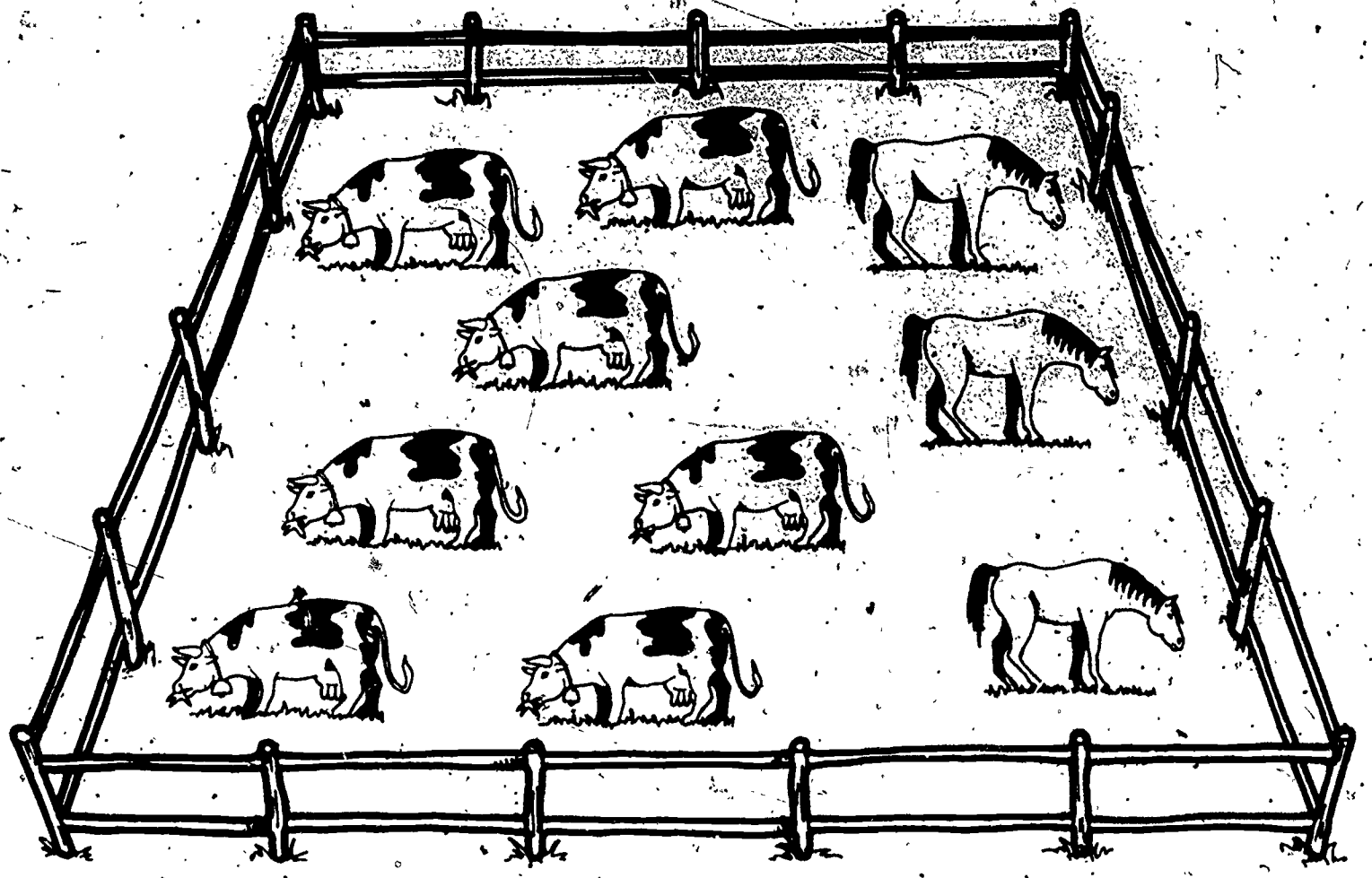
1. Say	START AT SIX AND COUNT FOR ME. (10)
2. If no response or starts at one, say	I WANT YOU TO COUNT LIKE THIS. 6,7, 8. NOW YOU DO IT. (11)
3. If the student stops before 15, say	THAT'S FINE. KEEP GOING.
4. If the student counts to 15 or makes 2 consecutive errors, say	THAT'S FINE. YOU MAY STOP NOW.



Put a pile of 50 beans to the student's right.	
1. Point to the picture. Say	THIS IS A PICTURE OF SOME BEANS.
2. Point to a clear space in front of the student. Say	MAKE A SET WHICH HAS MORE BEANS THAN THE PICTURE. (12)

Materials: 50 beans

1. Say	I AM GOING TO READ A STORY. I'LL ASK YOU A QUESTION. YOU ANSWER THE QUESTION.
2. Say . (Repeat story, if necessary.)	I HAVE THREE PENCILS. YOU HAVE TWO PENCILS. HOW MANY PENCILS DO WE HAVE TOGETHER? (13)



1. Point to the picture. Say	COUNT THE HORSES.	(14)
2. Say	COUNT THE COWS.	(15)
3. Say	COUNT THE ANIMALS.	(16)
4. If the student does not count <u>all</u> the animals, say	COUNT <u>ALL</u> THE ANIMALS.	(17)
5. Say	ARE THERE MORE ANIMALS OR MORE COWS?	(18)

1. Give the student a box, say	HERE IS A BOX FOR YOU TO USE.
2. Point to the other box, say.	THIS IS MY BOX.
3. Place the 9 large beans in a pile next to the student's box. Say	HERE ARE SOME BEANS FOR YOU TO USE.
4. Put the 9 small beans next to your box. Say	I'LL USE THESE BEANS.
5. As you put a bean in your box, say	I'LL PUT ONE BEAN IN MY BOX, AND YOU PUT A BEAN IN YOUR BOX.
6. As you put the second bean in your box, say	I'LL PUT ANOTHER BEAN IN MY BOX AND YOU PUT A BEAN IN YOUR BOX.
7. As you put the third bean in your box, say	LET'S DO IT AGAIN.
8. Continue without verbal directions until all 9 beans are used. But, if a student doesn't follow suit, say	NOW YOU PUT A BEAN IN YOUR BOX. (19)
9. Say	DO BOTH BOXES HAVE THE SAME NUMBER OF BEANS OR DOES ONE BOX HAVE MORE BEANS? (20)
10. If the student says one box has more but does not indicate which has more, ask	WHICH ONE? (21)
11. Ask	HOW DO YOU KNOW? (22)

(10) Materials: 2 boxes, 9 large beans, 9 small beans

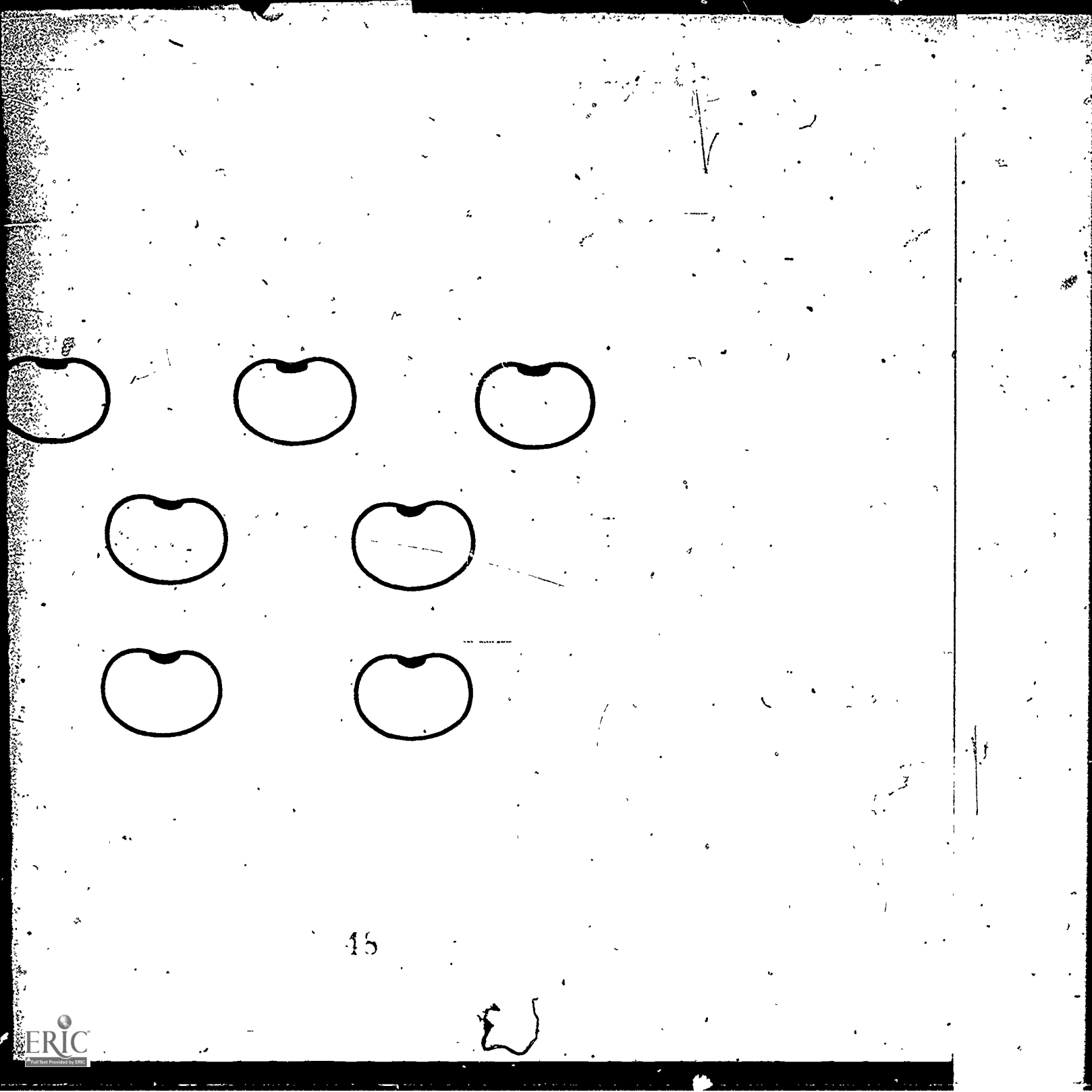
1. Say	START AT 90 AND COUNT FOR ME. (23)
2. If no response or starts at one, say	I WANT YOU TO COUNT LIKE THIS. 90, 91, 92. NOW YOU DO IT. (24)
3. If the student stops before 112, say	THAT'S FINE. KEEP GOING.
4. If the student counts to 112 or makes 2 consecutive errors, say	THAT'S FINE. YOU MAY STOP NOW.

Item 12: Remove this sheet from test booklet and place on table in front of child.

Place the card with 7 stars on it in front of the student. Say. 1. Place 50 beans to the student's right. Say.	HERE IS A PICTURE OF SOME STARS. HERE ARE SOME BEANS. PUT A BEAN ON EACH STAR. (25)
2. If the student does it incorrectly, place two beans on two stars and say If the student still cannot do it correctly, say	NOW YOU DO THE REST. SEE, I AM PUTTING A BEAN ON EACH STAR.
3. Sweep the beans off the stars and cover the pile of beans with your hand. Ask	HOW MANY BEANS DO I HAVE UNDER MY HAND? (26)

Materials: Card with 7 stars
50 beans.

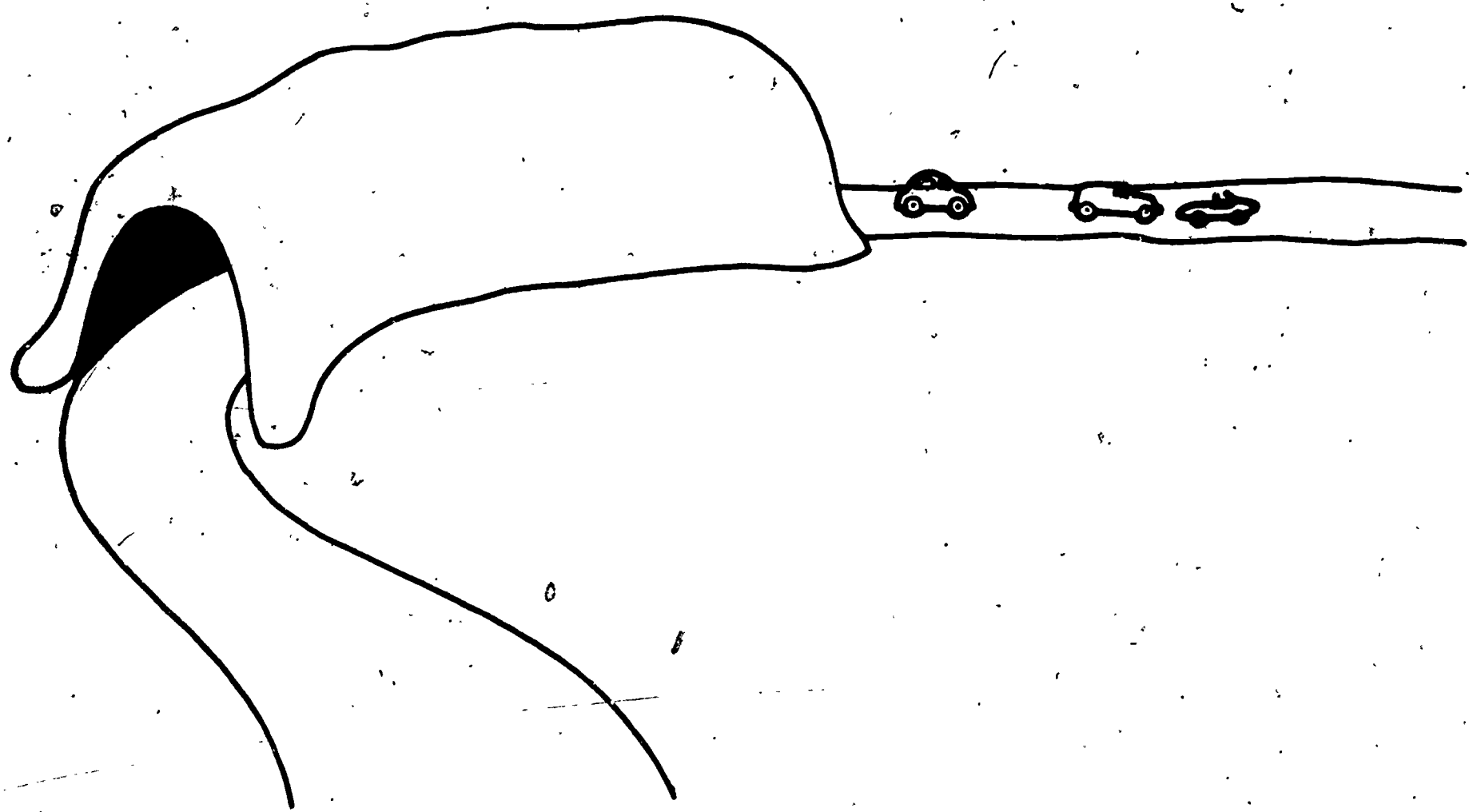
1. Say	I AM GOING TO READ A STORY. I'LL ASK YOU A QUESTION. YOU ANSWER THE QUESTION.
2. Say (Repeat story, if necessary.)	I HAD SEVEN TOY CARS. YOU TOOK THREE TOY CARS. HOW MANY TOY CARS DO I HAVE NOW? (27)



Put a pile of 50 beans to the student's right. 1. Point to the picture. Say	THIS IS A PICTURE OF SOME BEANS.
2. Point to a clear space in front of the student. Say	MAKE A SET WHICH HAS LESS BEANS THAN THE PICTURE. (28)

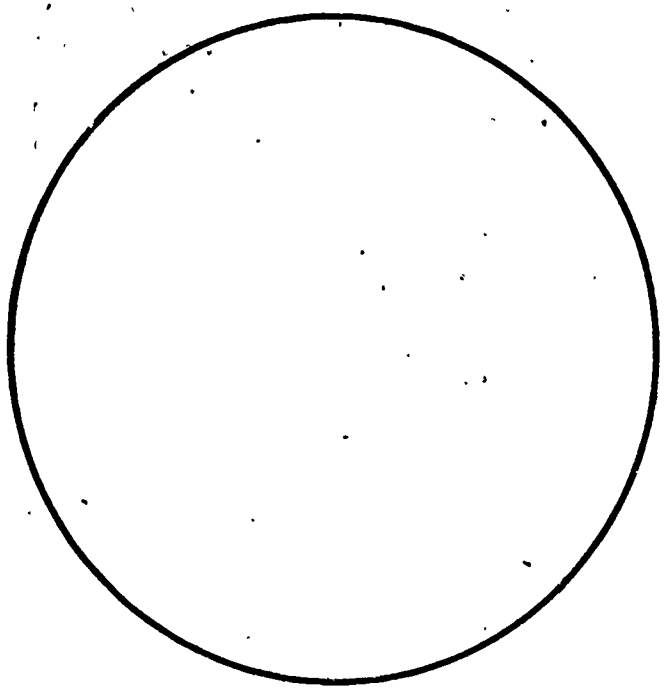
Materials: 50 beans

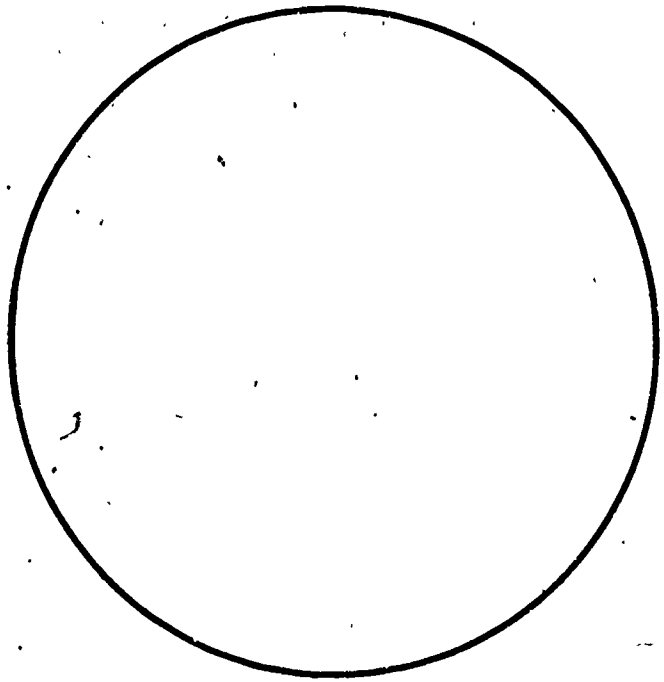
1. Say	COUNT BY TENS FOR ME. (29)
2. If no response or if the student counts by ones, say	I WANT YOU TO COUNT LIKE THIS. TEN, TWENTY, THIRTY. NOW YOU DO IT. (30)
3. If the student stops before 130, say	THAT'S FINE. KEEP GOING.
4. If the student counts to 130 or makes 2 consecutive errors, say	THAT FINE. YOU MAY STOP NOW.

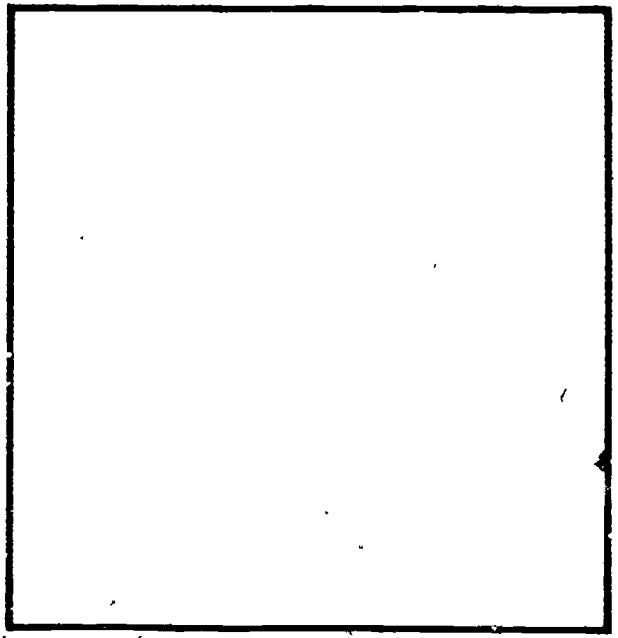


1. Point to the tunnel, say	THIS IS A TUNNEL.
2. Make a sweeping motion, pointing to the cars then the tunnel, while saying Ask	THERE ARE THREE CARS OUTSIDE THE TUNNEL, AND THERE ARE SIX CARS STILL IN THE TUNNEL. HOW MANY CARS ARE THERE ALL TOGETHER? (31)

1. Ask	WHAT NUMBER COMES JUST BEFORE 5?	(32)
2. Ask	WHAT NUMBER COMES JUST BEFORE 8?	(33)
3. Ask	WHAT NUMBER COMES JUST BEFORE 14?	(34)





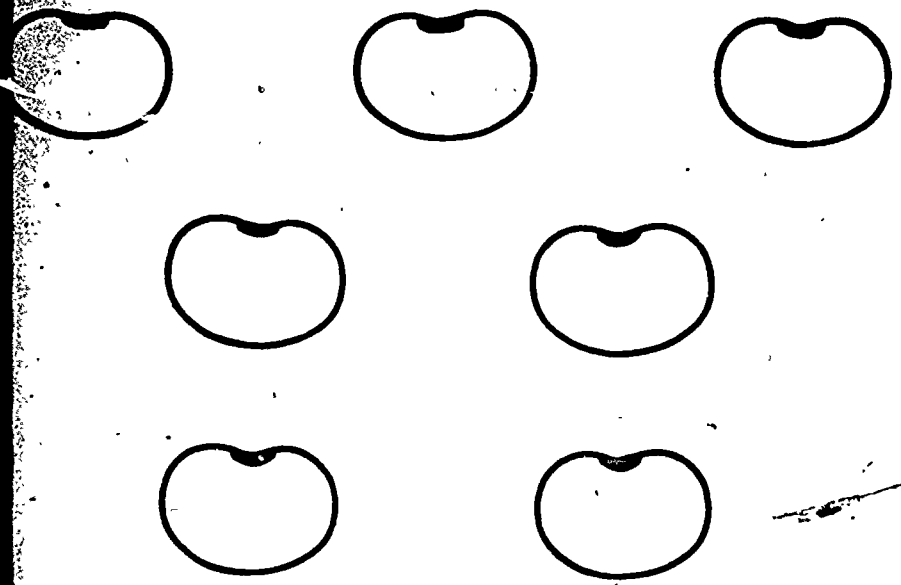


Item 18: Remove this sheet from test booklet and place in front of child, circles close to child.

1. Place the card in front of the student with the two circles closest to the student. Put 50 beans beside the card. Say Point to the circle on your left. Say (If the student places other than three beans in the circle, do not correct him. Record the number of beans placed.)	HERE ARE SOME BEANS FOR YOU TO USE. PUT THREE BEANS IN THIS CIRCLE. (35)
2. Point to the other circle, say (If the student places other than four beans in the circle, do not correct him. Record the number of beans placed.)	PUT FOUR BEANS IN THIS CIRCLE. (36)
3. Ask	HOW MANY BEANS ALL TOGETHER? (37)
4. Point to the square. If student does not respond, move beans inside square and say	PUT ALL THE BEANS IN THE SQUARE. (38) NOW ALL THE BEANS ARE INSIDE THE SQUARE.
5. Ask	HOW MANY BEANS ARE IN THE SQUARE? (39)

Materials: Card with 2 circles and a square, 50 beans

1. Say	COUNT BY 2'S FOR ME. (40)
2. If counts by 1's or no response, say	I WANT YOU TO COUNT LIKE THIS. TWO, FOUR, SIX. NOW YOU DO IT. (41)
3. If the student stops before 20, say	THAT'S FINE. KEEP GOING.
4. If the student counts to 20 or makes 2 consecutive errors, say	THAT'S FINE. YOU MAY STOP NOW.

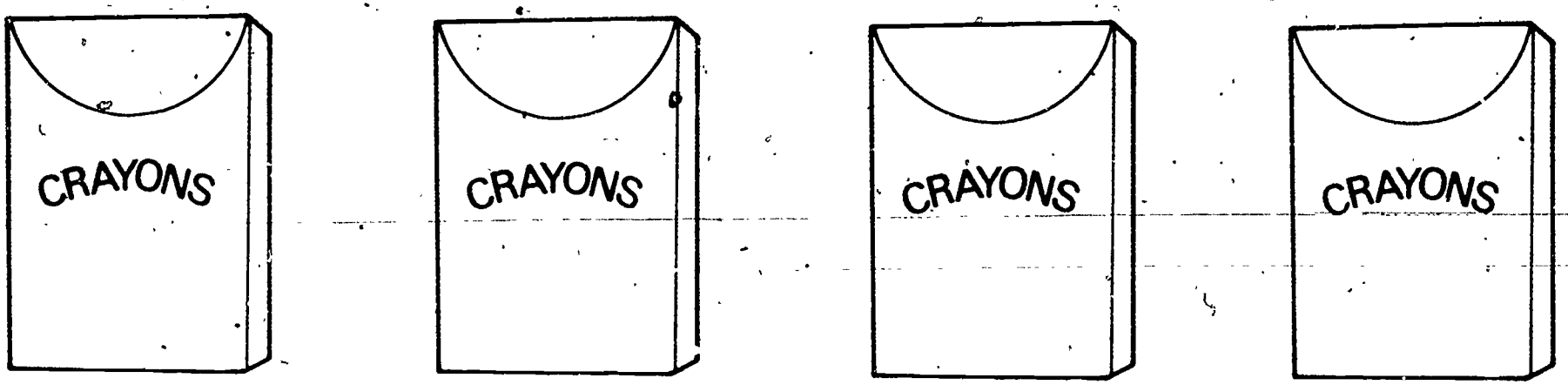


Put a pile of 50 beans to the student's right. 1. Point to the picture. Say	THIS IS A PICTURE OF SOME BEANS.
2. Point to a clear space in front of the student. Say	MAKE A SET WHICH HAS ONE MORE BEAN THAN THE PICTURE. (42)

Materials: 50 beans

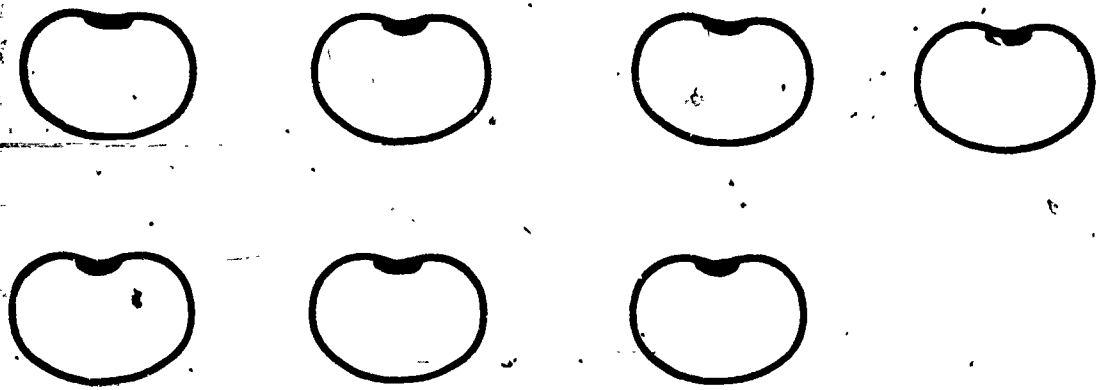
1. Say	I AM GOING TO READ A STORY. I'LL ASK YOU A QUESTION. YOU ANSWER THE QUESTION.
2. Say (Repeat story, if necessary.)	TOGETHER WE HAVE SIX PENNIES. YOU HAVE FOUR PENNIES. HOW MANY PENNIES DO I HAVE? (43)

(21)


CRAYONS
CRAYONS
CRAYONS
CRAYONS

1. Point to each box and say	THERE ARE 10 CRAYONS IN THIS BOX. THERE ARE 10 CRAYONS IN THIS BOX. THERE ARE 10 CRAYONS IN THIS BOX, THERE ARE 10 CRAYO. S IN THIS BOX. HOW MANY CRAYONS ARE THERE, ALL TOGETHER? (44)
2. If no response, or the student counts by ones, say	COUNT THEM BY TENS. (45)

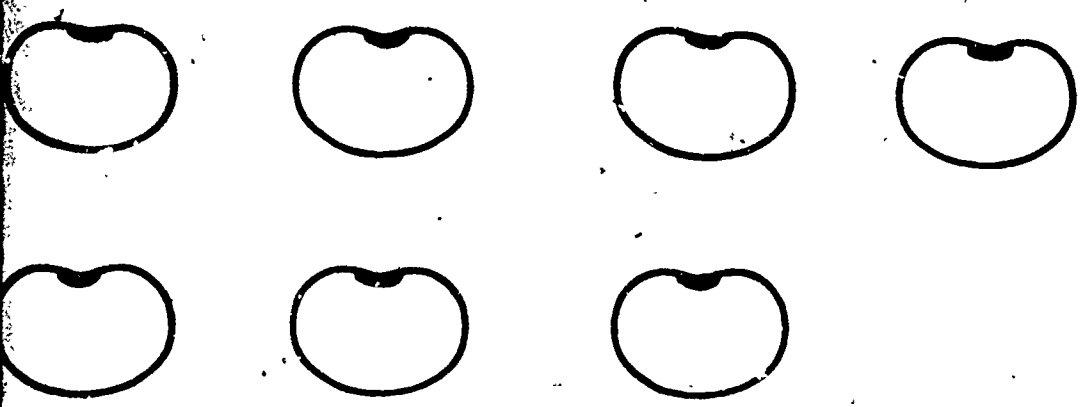
1. Say	START AT SIX AND COUNT BACKWARDS FOR ME. (46)
2. If no response, say	I WANT YOU TO COUNT LIKE THIS. 6, 5, 4. NOW YOU DO IT. (47)
3. If the student stops before 1, say	THAT'S FINE. KEEP GOING.
4. If the student counts to 1 or makes 2 consecutive errors, say	THAT'S FINE. YOU MAY STOP NOW.



Put a pile of 50 beans to the student's right. 1. Point to the picture. Say	THIS IS A PICTURE OF SOME BEANS.
2. Point to a clear space in front of the student. Say	MAKE A SET WHICH HAS ONE LESS BEAN THAN THE PICTURE. (48)

Materials: 50 beans

1. Ask	WHAT NUMBER COMES BETWEEN 3 AND 5? (49)
2. Ask	WHAT NUMBER COMES BETWEEN 7 AND 9? (50)
3. Ask	WHAT NUMBER COMES BETWEEN 14 AND 16? (51)



Put a pile of 50 beans to the student's right. 1. Point to the picture. Say	THIS IS A PICTURE OF SOME BEANS.
2. Point to clear space in front of the student. Say	MAKE A SET THAT HAS THE SAME NUMBER OF BEANS AS THE PICTURE. (52)

Materials: 50 beans

1. Ask	WHAT NUMBER COMES BETWEEN 6 AND 4? (53)

PMDC MATHEMATICS TEST
GRADE ONE

EXAMINER'S MANUAL

AND

STATISTICAL DATA

BY

TOM DENMARK

TESTING PUBLICATION NO. 1

FLORIDA STATE UNIVERSITY
TALLAHASSEE, FLORIDA
MAY 1976

FINANCIAL SUPPORT FOR THE PROJECT FOR THE MATHEMATICAL DEVELOPMENT OF CHILDREN HAS BEEN PROVIDED BY THE NATIONAL SCIENCE FOUNDATION: GRANT NO. PES 74-18106-A03.

PMDC Mathematics Test--Grade One

Examiner's Manual

The PMDC Mathematics Test--Grade One is an individually administered test designed to assess students' attainment of concepts and skills related to the following topics: Counting, Set Equivalence, Ordering of Numbers, Addition and Subtraction, and Class Inclusion. This test does not include conventional paper-pencil items. Directions are given orally, and the student responds orally and/or by demonstrating the solution to a problem with manipulative aids. The items within the test are organized from easy to hard, and combine several content strands within each difficulty level.

The PMDC Mathematics Test--Grade One is administered in accordance with instructions incorporated with the test items. The purpose of this manual is to provide additional guidelines to insure that all students experience as nearly as possible the same testing situation. This Examiner's Manual is organized into the following eight parts:

Part I: Description Of Test Materials
Part II: Preparation For Administration
Part III: Meeting the Student and Introducing the Test
Part IV: Administering the Test
Part V: Recording Student Responses
Part VI: Completion of Testing
Part VII: Statistical Data On PMDC Mathematics Test--Grade One
Part VIII: PMDC Response Form and Student Profile Sheet

Part I: DESCRIPTION OF TEST MATERIALS

A. Test Book

The test items and directions make up a loose-leaf notebook interior. When opened and placed on a stand (large metal bookend), the notebook forms an easel which presents the stimuli material to the student and at the same time provides the examiner with instructions, test items, lists of manipulatives and pictures needed, and the numerical key to the Student Response Form.

B. Student Response Form

1. Description

A student's response to an item is recorded on the Response Form. A copy of this form is included in the test book, immediately following the title page, and in Part VIII of this manual. Each test question is numerically keyed to a box on the Student Response Form. To the right of each test question is an encircled number. This number corresponds to a box with the same number on the Student Response Form. At the bottom of the Student Response Form is a space in which the examiner can note additional information about the student's responses or the student's behavior during the test.

2. Format

The response boxes are arranged sequentially from left to right across the Student Response Form by rows. For example, on the grade 1 Student Response Form, boxes 1 to 9 appear from left to right in row 1 and boxes 10 to 18 appear from left to right in row 2.

More than one box for one test item may be placed together (for example, boxes 1 and 2 in the Grade One test.) This means that two or more questions belong with a single test item. There is a separate box for each question.

Each box is comprised of either one or two columns. Generally the first (or only) column is for recording the student's response. This column is usually titled RESPONSE, but may be assigned a more descriptive title such as NO. BEANS. Within this column, likely responses are listed, such as no attempt, the correct response (indicated by parentheses), and in a few cases other common responses. The blank area at the bottom of the column is for recording other than the specified responses. The second column is for recording the student's errors and/or the method used in responding to the question. Listed are the more probable errors or methods. The alternative, OTHER, is circled when the student makes an error or uses a method not listed. The examiner may elaborate on the error or method in the COMMENTS section of the Student Response Form.

C. Manipulatives and Pictures

The administration of test requires a set of manipulatives and pictures in addition to the pictures contained in the test book. The materials specified in the table below should be collected prior to testing. On each item page is a list of materials which are needed for that item.

GRADE ONE TEST: MATERIALS

Materials	Items
50 beans	2,7,12,14,18,20,24,26
*Card with 5 ducks	5
2 boxes or cups, 9 large beans, 9 small beans	10
*Card with 7 stars	12
*Card with 2 circles and a square	18

*Included in the test book.

D. Student Profile Sheet

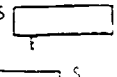
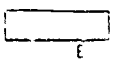
The Student Profile Sheet is used for summarizing the students' responses by content scales. A copy of this form is included in Part VIII of this Examiner's Manual. Instructions for completing this form are discussed below (Part VI Completion of Testing)

Part II. PREPARATION FOR ADMINSTRATION

A. Instructions

The examiner must become familiar with the guidelines detailed in this manual. Since the PMDC Mathematics Test--Grade One is administered from instructions incorporated with the test items, the examiner should practice giving the test prior to testing students The examiner should also become familiar with the organization of the Student Response Form.

B Seating

To allow the examiner to view both sides of the test book, and shield the Student Response Form from the student, a right-handed examiner should seat the student on her/his left  and a left-handed examiner should seat the student on her/his right 

C Materials

Be sure that all materials (Test Book, Student Response Form, manipulatives and pictures) are collected prior to the administration of the test.

Place the manipulatives and pictures so that they are accessible to the examiner and shielded from the student On each item page is a list of the manipulatives and/or pictures which accompany the item

Part III MEETING THE STUDENT AND INTRODUCING THE TEST

Attempt to put the student at ease One way to do this is to talk with the student for a brief time about things unrelated to the test The following sequence will help to minimize the student's anxiety about the testing situation.

A Introduce yourself to the student.

HELLO, MY NAME IS

B Ask the student her/his full name if you do not know it

WHAT IS YOUR FIRST NAME? WHAT IS YOUR LAST NAME?

Fill in the blank on the Student Response Form for the STUDENT'S NAME

C Spend approximately 30 seconds in social conversation

Suggested leading questions are

DO YOU HAVE ANY BROTHERS OR SISTERS?
DO YOU HAVE ANY PETS?
HOW OLD ARE YOU? WHEN IS YOUR BIRTHDAY?

WHO IS YOUR TEACHER?

D. Introduce the Test

Do NOT refer to the PMDC Test as a test or a game. There are two main points you need to convey. The suggested dialogue is:

WE ARE GOING TO LOOK AT A BOOK WHICH CONTAINS SOME INTERESTING PICTURES AND QUESTIONS.

(pause)

I'LL ASK YOU SOME QUESTIONS ABOUT THE PICTURES. YOU ANSWER THEM. IF I ASK YOU ABOUT SOMETHING YOU HAVEN'T LEARNED, JUST TELL ME YOU DON'T KNOW AND I'LL SHOW YOU ANOTHER PICTURE, O K ?

Part IV. ADMINISTERING THE TEST

Remember, this is an evaluation and should not be used as a teaching situation.

A Follow the written directions carefully The examiner may probe to get an answer with the statement "Tell me more." Do not probe any further, except when specified in the written directions for the question For some items a second or probing question is incorporated with the test directions. The second question should be asked when the student does not attempt to answer the initial question or when the student's response to the initial question indicates that the student did not understand the meaning of that question

B. Address questions and comments to the student, not the book or the response form. Eye contact is important for control and rapport. Reassure the student without specifying that responses are right or wrong. This may be done in a variety of ways.

1 Repeat what the student has said in a reassuring voice.

2 Remarks should be positive and limited to "Um-hum," "All right," "Fine," and "O.K."

3 Physical expressions should be positive and limited to a smile and a nod of the head

C To regain a student's attention, the examiner may precede the question with "O.K.", the student's name, and/or "Now, here are some more interesting pictures and questions."

D. If a student does not understand the question, repeat the written question only. Remember, rephrasing a question would violate the standardization of the administration.

E. Time Limits

If a student does not respond after 15 seconds, point to the item and ask,

DO YOU KNOW HOW TO DO THIS?

If the student says "Yes," allow 10 more seconds for a response If the student says "No," or does not respond after the additional 10 seconds, proceed to the next item saying,

LET'S DO SOMETHING ELSE

Part V. RECORDING STUDENT RESPONSES

Record student responses by CIRCLING the appropriate alternative in the appropriate space on the Student Response Form

A. RESPONSE column

This column is generally titled RESPONSE ~~but~~ may be assigned a more descriptive title such as NO. BEANS

1. If a student says he does not know the answer or does not respond at all, CIRCLE the alternative NO ATTEMPT

2. If a student responds correctly, CIRCLE the alternative which is enclosed in parentheses.

3 If a student responds incorrectly and that response is listed as an alternative, CIRCLE the alternative

4. If a student responds incorrectly, and that response is not listed, WRITE BRIEFLY the response in the blank space.

B. ERROR column

This column is used for the oral counting items. As noted in the test instructions, the examiner terminates the counting proces when the student makes two errors.

1. If a student omits one number while counting, for example, 1,2,4,5, CIRCLE the

alternative SKIP NUMBER.

2 If a student orders two numbers incorrectly while counting, for example, 1,2,3,5,4, CIRCLE the alternative INCORRECT ORDER.

3. If a student counts incorrectly in a manner other than omitting one number or ordering two numbers incorrectly, CIRCLE the alternative OTHER.

C. METHOD column

This column is used for collecting information about the methods students use to solve the problems presented. Circle the alternative that best applies to the nature of the student's response. Two alternatives which are common to most of the Method Columns are Immediate and Other.

1) Immediate. If a student responds to a question or statement within 3 seconds and it is difficult to discern the method or process used, circle Immediate.

2) Other. If a student responds to a question or statement in a manner not described by the list of alternatives, circle Other. The examiner may want to elaborate on the Other method or procedure used. To avoid a situation in which the student would be forced to wait, with no interaction, jot a brief note beside Other as a reminder and wait until the testing is complete before elaborating. After testing, describe the method or procedure in the Comments section of the Student Response Form, using the numerical key to identify the item.

D Discussion of Methods

The student may use one of several strategies in responding to questions related to the construction of a set. For example, in response to item 7 question 12 ("Make a set with more beans") the student may count the beans in the picture and then count out 8 or more beans. This method would be recorded by circling the alternative: Counted. Other students may exhibit no evidence of counting and respond by using one-to-one correspondence to reproduce with the beans the picture set and add at least one more bean. This method would be described by the alternative: Matched. A third strategy would be for the student to move a large pile of beans into the response space without any evidence of counting. In this case, the alternative Gross should be circled. If the student uses a combination of the above methods or a completely different method, the alternative Other should be circled and the method described in the Comments section.

E Comments Section

Immediately after the administration of the test is completed, the examiner should note in the Comments section any behavior of the student which might have affected the student's responses. For example, it should be noted if the student became tired during the administration of the test, was not at ease during the test, gave impulsive responses without giving thought to the questions, exhibited a short attention span, or did not understand the examiner.

Part VI COMPLETION OF TESTING

Thank the student for participating. If the testing situation is one in which more than one student is being tested in the same room and the testing of other children is not complete, talk quietly with the student until all testing is completed. Working around, game playing, or loud talking may disturb the testing of the other student(s).

Information from the Student Response Form should be transferred to the Student Profile Sheet. The Student Profile Sheet provides a summary of right/wrong responses by content scales. In transferring the data from the Student Response Form to the Student Profile Sheet, make a check in the Yes column if the student gave a correct response to either the initial question or to the second question for a given item.

In scoring counting questions on which the student made only one error (for example, in counting to 35 the student omits 24) count the response as correct and note the skipped number in the Comments column. Methods used by the student in responding to a question should also be noted in the Comments column. If it was necessary to ask the second question, note this by circling the number in the Item Number column. This information will provide an indication of the student's understanding of the directions for the item.

Incorrect responses are recorded on the Student Profile Sheet by making a check in the No column. Observations of the student's errors and the methods used should also be recorded. In recording responses to counting questions where the student only partially completes the task, check No and indicate in the Comments column how far he counted.

Questions 7, 19, 21, 25, and 38 on the Student Response Form are not transferred to the Student Profile Sheet. These questions, therefore, are not counted in the computation of a student's raw score. The maximum score on the PMDC Mathematics Test--Grade One is 39. This score takes into account the use of alternative questions on some items.

Part VII. STATISTICAL DATA ON PMDC MATHEMATICS TEST--GRADE ONE

The PMDC Mathematics Test--Grade One was administered to 197 entering first grade students, 97 boys and 100 girls, during the first three weeks of September 1975. Students in this sample were attending one of five elementary schools. Two schools were located in Tallahassee, Florida, and the other three schools in Athens, Georgia. The schools were quite varied in their composition in terms of socio-economic variables: race, parental education, family income, parental occupation.

The students in the sample population were also given the Otis-Lennon Mental Ability Test and the KeyMath Diagnostic Arithmetic Test. The mean IQ for the sample was 101 with a standard deviation of 19. The IQ measures ranged from a low of 54 to a high of 150. The mean raw score on the KeyMath Test was 42 (grade equivalent of 1 year 3 months), with a standard deviation of 17. The raw scores ranged from a low of 2 to a high of 93.

The maximum score on the PMDC grade one test is 39. The test questions used in obtaining a total score are sub-divided into six scales: Elementary Counting, Advanced Counting, Set Equivalence, Addition and Subtraction, Ordering Numbers, and Class Inclusion. A summary of the descriptive statistics for the total test and for each scale is given in the table below.

PMDC Mathematics Test--Grade One
Statistical Data

Scale	Number Questions	Mean	Standard Deviation	Reliability
Elementary Counting	9	8	2 1	0 80
Advanced Counting	4	0 8	1 2	0 73
Set Equivalence	8	4.9	2 4	0 79
Addition Subtraction	6	2 9	1 6	0 64
Ordering Numbers	10	6 2	3.0	0 86
Class Inclusion	2	0 6	0 8	*
Total Test	39	22 9	8 6	0 93

*Could not be computed due to the small number of items.

The questions associated with each scale are identified on the Student Profile Sheet. The reliability coefficients listed in the table are Cronbach alphas and provide a measure of the internal consistency of the scales. The Spearman-Brown split halves formula was also used to compute reliability on the total test and yielded a coefficient of 0.95.

Correlations among the students' performances on the PMDC, KeyMath and Otis-Lennon tests are given below.

Correlation between PMDC and KeyMath measures	0 79
Correlation between PMDC and Otis Lennon measures	0 72
Correlation between KeyMath and Otis-Lennon measures	0 75

Part VIII. STUDENT RESPONSE FORM AND STUDENT PROFILE SHEET

The Student Response Form and the Student Profile Sheet are included in this Examiner's Manual. One copy of each form is needed for each student tested. These forms may be reproduced without additional permission from PMDC.

PMDC ARITHMETIC TEST, GRADE 1

STUDENT RESPONSE FORM

STUDENT'S NAME _____ DATE _____

STUDENT'S ID # _____ EXAMINER _____

1

Response	Errors
No Attempt (Correct) ____ to ____	Skip Number Incorrect Order Other

2

Response	Errors
No Attempt (Correct) ____ to ____	Skip Number Incorrect Order Other

3

No. Beans
No Attempt (6)

4

Response
No Attempt (4)

5

Response
No Attempt (9)

6

Response
No Attempt (14)

7

Response
No Attempt (Yes) No

8

Response
No Attempt (Animals) Cows Neither/Same Other

9

Response	Method
No Attempt 	Immediate Counted Matched Other

10

Response	Errors
No Attempt (Correct) ____ to ____	Skip Number Incorrect Order Other

11

Response	Errors
No Attempt (Correct) ____ to ____	Skip Number Incorrect Order Other

12

No. Beans	Method
No Attempt (Greater than 7)	Counted Matched Gross Other

13

Response	Method
No Attempt (5)	Immediate Counted Other

14

Horses
No Attempt (3)

15

Cows
No Attempt (7)

16

Animals
No Attempt (10)

17

Repeat All
No Attempt (10)

18

Response
No Attempt (Animals) Cows Other

19

Task Completed
Yes No

20

Response
No Attempt (Same) Not Same

21

Which One?
No Attempt Small Beans Large Beans

22

Response
No Attempt Bean Size One for One Other

23

Response	Errors
No Attempt (Correct) ____ to ____	Skip Number Incorrect Order Other

24

Response	Errors
No Attempt (Correct) ____ to ____	Skip Number Incorrect Order Other

25

Constructed
No Attempt Without Help With Help Incorrectly

26

Response	Method
No Attempt (7)	Immediate Counted Stars Other

27

Response	Method
No Attempt (4)	Immediate Counted Other

28

No. Beans	Method
No Attempt (Less than 7)	Counted Matched Gross Other

29

Response	Errors
No Attempt (Correct) ____ to ____	Skip Number Incorrect Order Other

30

Response	Errors
No Attempt (Correct) ____ to ____	Skip Number Incorrect Order Other

31

Response	Method
No Attempt (9)	Immediate Counted 1–9 Counted On Pointed Other

32

Response
No Attempt (4)

33

Response
No Attempt (7)

34

Response
No Attempt (13)

35

Beans (1)
No Attempt (3)

36

Beans (2)
No Attempt (4)

37

Total Beans	Method
No Attempt (7)	Immediate Count Other

38

Square
Yes No

39

Total Beans	Method
No Attempt (7) Other	Immediate Count Other

40

Response	Errors
No Attempt (Correct) ____ to ____	Skip Number Incorrect Order Other

41

Response	Errors
No Attempt (Correct) ____ to ____	Skip Number Incorrect Order Other

42

No. Beans	Method
No Attempt (8)	Counted Matched Gross Other

43

Response	Method
No Attempt (2)	Immediate Counted Other

44

Response	Method
No Attempt (40)	Immediate Counted by Tens Counted by Ones Other

45

Response
No Attempt (40)

46

Response	Errors
No Attempt (Correct) ____ to ____	Skip Number Incorrect Order Other

47

Response	Errors
No Attempt (Correct) ____ to ____	Skip Number Incorrect Order Other

48

No. Beans	Method
No Attempt (6)	Counted Matched Gross Other

49

Response
No Attempt (4)

50

Response
No Attempt (8)

51

Response
No Attempt (15)

52

No. Beans	Method
No Attempt (7)	Counted Matched Gross Other

53

Response
No Attempt (5)

Test Behavior _____

Comments _____

pmdc

PMDC ARITHMETIC TEST, GRADE 1

STUDENT'S NAME _____

STUDENT PROFILE SHEET

STUDENT'S ID NUMBER _____

	Item Response Number	TASK	YES	NO	COMMENTS
Elementary Counting	1 or 2	Count from 1 to 35			
	3	Construct a set, using beans, corresponding to a written numeral (6)			
	10 or 11	Count from 6 to 15			
	14	Count a picture set of horses (3)			
	15	Count a picture set of cows (7)			
	16 or 17	Count a picture set of animals (10)			
	35	Construct a set with 3 members in response to oral directions			
	36	Construct a set with 4 members in response to oral directions			
	46 or 47	Count back from 6 to 1			
Advanced Counting	23 or 24	Count from 90 to 112			
	29 or 30	Count by tens from 10 to 130			
	40 or 41	Count by twos from 2 to 20			
	44 or 45	Count by tens to determine the number of crayons in four boxes, each with 10 crayons			
Set Equivalence	9	Establish the number equivalence (5) of two picture sets without explicit directions to count the sets or to establish 1-1 matching between the sets			
	12	Construct a set with more members than a given pictured set (7)			
	20 or 22	Determine whether two sets have the same number (9) of members after the two sets were constructed by 1-1 matching			
	26	Determine the number of members in a set having established that it is equivalent to a set with 7 members			
	28	Construct a set with less members than a given pictured set (7)			
	42	Construct a set with one more member than a given pictured set (7)			
	48	Construct a set with one less member than a given pictured set (7)			
	52	Construct a set with the same number (7) of members as a given pictured set			
Ordering Numbers	4	Tell the number which comes just after a given number (3)			
		Tell the number which comes just after a given number (8)			
		Tell the number which comes just after a given number (13)			
	3	Tell the number which comes just before a given number (5)			
	33	Tell the number which comes just before a given number (8)			
	34	Tell the number which comes just before a given number (14)			
	49	Tell the number which comes between two numbers (3 and 5)			
	50	Tell the number which comes between two numbers (7 and 9)			
	51	Tell the number which comes between two numbers (14 and 16)			
	53	Tell the number which comes between two numbers (6 and 4)			
Addition	13	Solve an addition problem-solving exercise (sum 5), oral directions			
Subtraction	27	Solve a subtraction-problem-solving exercise (minuend 7), oral directions			
	31	Find the number of a picture set (C) where one subset is explicitly shown (A) and a second subset if covered (B), N (B) is given			
	37	Given two disjoint sets (with 3 and 4 elements), determine how many altogether without joining the sets			
	39	Determine the number (7) of a set which was formed by joining two disjoint sets with 3 and 4 members			
	43	Solve a missing addend problem-solving exercise (sum 6), oral directions			
Class Inclusion	8	Answer a class inclusion question, without explicit directions to count the sets (numbers 10 or less)			
	18	Answer a class inclusion question, after having counted the members in each set (numbers 10 or less)			

PMDC

Grade 2

September 1975

PROJECT FOR THE MATHEMATICAL DEVELOPMENT OF CHILDREN

MATHEMATICS TEST: GRADE TWO

Financial support for the Project for the Mathematical Development of Children has been provided by the National Science Foundation: Grant No. PES 74-18106-A03.

TO THE USER

The PMDC Mathematics Test: Grade Two was pilot-tested during July 1975. The test was then revised and administered during the first three weeks of September 1975 to 158 students. The test in this packet is the latter test. The user may reproduce any of the materials in this packet without obtaining permission from PMDC. Those persons who use the PMDC Mathematics Test: Grade Two are encouraged to share with the PMDC staff their evaluation of the test and the data they collect. Such correspondence should be addressed to:

Dr. Eugene D. Nichols
Florida State University
Tallahassee, Florida 32306

Instructions for administering the test and summaries of the pertinent statistical analyses are included in the accompanying Examiner's Manual. More detailed analyses of the data obtained from the 1975 Fall Testing Program are reported in PMDC Technical Reports Nos. 2 and 3. Information about these publications may be obtained by writing to the above address.

PMDC ARITHMETIC TEST, GRADE 2 — STUDENT'S NAME _____ DATE _____

STUDENT RESPONSE FORM — STUDENT'S ID # _____ EXAMINER _____

1

Response	Method
No Attempt (13)	Immediate Counting touch Counting visual Other

2

Response
No Attempt (2 3 5 9) 9 5 3 2 Other

3

Response
No Attempt (Yes) No

4

Response
No Attempt (Animals) Cows Neither/Same Other

5

Response	Method
No Attempt (6) Without beans	Counted On Counted 2, 4, then 6 Other

6

Response	Errors
No Attempt (Correct) to	Skip Number Incorrect Order Other

7

Response	Errors
No Attempt (Correct) to	Skip Number Incorrect Order Other

8

Response	Method
No Attempt (4) Without beans	Counted Back Counted 7, 3, then 4 Other

9

Horses
No Attempt (3)

10

Cows
No Attempt (7)

11

Animals
No Attempt (10)

12

Repeat All
No Attempt (10)

13

Response
No Attempt (Animals) Cows Other

14

Response	Errors
No Attempt (Correct) to	Skip Number Incorrect Order Other

15

Response	Errors
No Attempt (Correct) to	Skip Number Incorrect Order Other

16

Response
No Attempt (12)

17

Response
No Attempt (5 - 4)

18

Response
No Attempt (3 - 2)

19

Response
No Attempt (3 - 2)

20

Response	Method
No Attempt (6)	Immediate Subtracted Counted On Other

21

Response	Errors
No Attempt (Correct) to	Skip Number Incorrect Order Other

22

Response	Errors
No Attempt (Correct) to	Skip Number Incorrect Order Other

23

Response	Method
No Attempt (23) Without beans	Counted On Counted 18, 5, then 23 Other

24

Response
No Attempt (9)

25

Response
No Attempt (4 - 1)

26

Response
No Attempt (7 - 2)

27

Response
No Attempt (7 - 2)

28

Response	Method
No Attempt (16) Without Beans	Counted Back Counted 23, 7 then 16 Addition Other

29

Response	Errors
No Attempt (Correct) to	Skip Number Incorrect Order Other

30

Response	Errors
No Attempt (Correct) to	Skip Number Incorrect Order Other

31

Response
No Attempt (4)

32

Response	Errors
No Attempt (Correct) to	Skip Number Incorrect Order Other

33

Response	Errors
No Attempt (Correct) to	Skip Number Incorrect Order Other

34

Response
No Attempt (24)

35

Method
No Attempt Added Pattern Guessed Other

36

Response
No Attempt (100)

37

Method
No Attempt Added Pattern Guessed Other

38

Response	Method
No Attempt (5)	Immediate Subtracted Counted On Other

39

Response	Method
No Attempt (60)	Immediate Counts by Tens Counts by Ones Other

40

Written
No Attempt (37)

41

Verbal	Method	
No Attempt (37)	Immediate	
	10 20 30 31 32	37
	30 31 32	37
	1 2 3 4	37
	1 2 3 4	37
	10 11 12	19
	Other	

42

Response	Method
No Attempt (34)	Counted by Tens and Ones Counted by Ones Other

43

Response	Method
No Attempt (45)	Counted by Tens and Ones Counted by Ones Other

44

Response	Method
No Attempt (30)	Immediate Subtracted Counted On Other

45

Response	Method
No Attempt (50)	Immediate Counted by Tens Counted by Ones Other

46

Written
No Attempt (43)

47

Verbal	Method	
No Attempt (43)	Immediate	
	10 20 30 40 41 42 43	
	40 41	43
	1 2 3	43
	1 2	7
	10 11 12	16
	Other	

48

Response	Method
No Attempt (37)	Counted by Tens and Ones Counted by Ones Other

49

Response	Method
No Attempt (52)	Counted by Tens and Ones Counted by Ones Other

50

Response	Method
No Attempt (20)	Immediate Subtracted Counted On Other

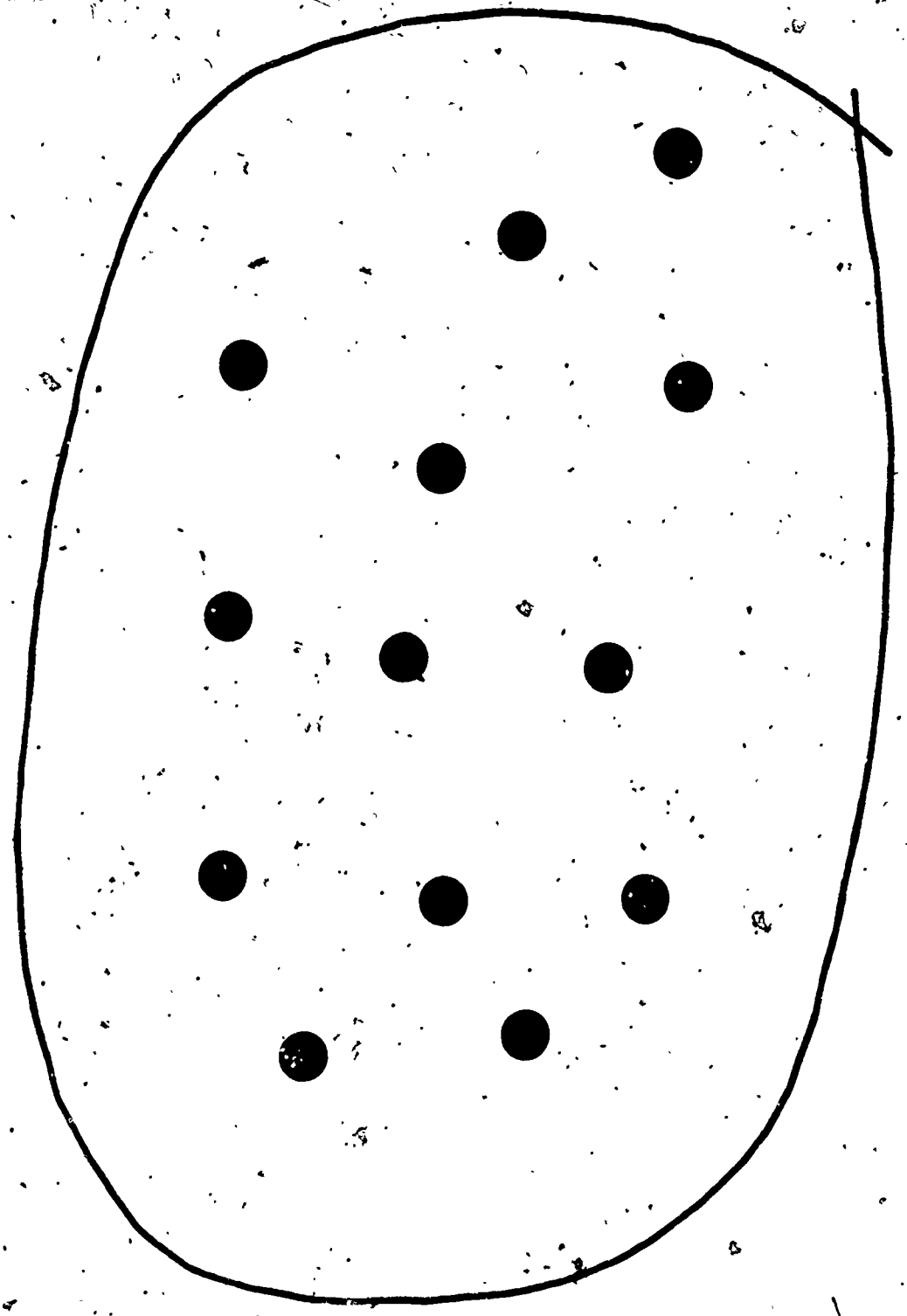
51

Response	Errors
No Attempt (Correct) to	Skip Number Incorrect Order Other

52

Response	Errors
No Attempt (Correct) to	Skip Number Incorrect Order Other

Test Behavior _____ Comments _____



1. Point to the dots, ask	HOW MANY DOTS ARE THERE? ①

① 101

105

53
92

Item 2: Remove this sheet from the book and cut out cards along dotted lines.

1. Hand the student the cards, stacked face up from top to bottom in this order:

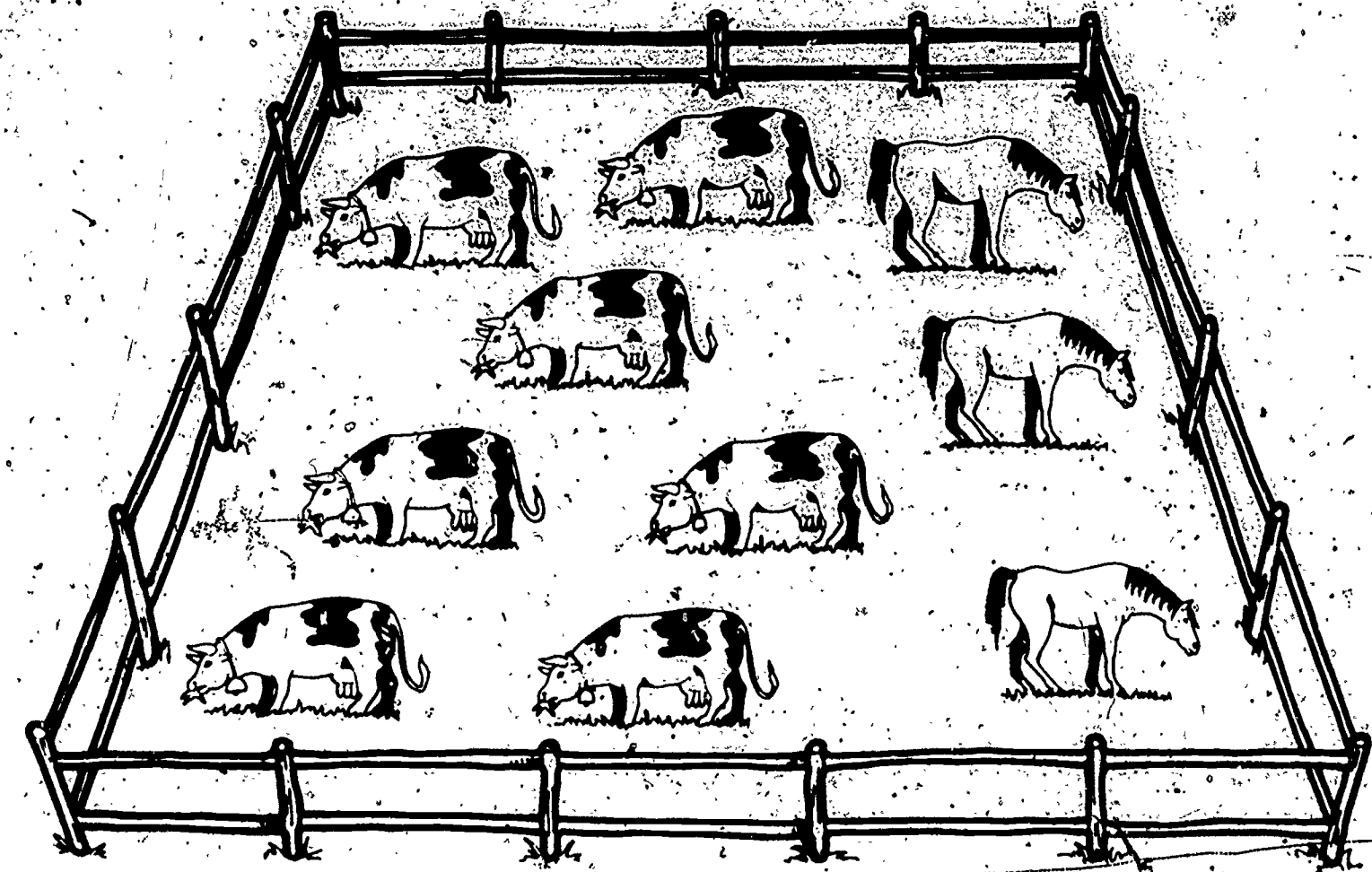
   5, 3, 9 and 2. Say

PUT THESE IN ORDER FROM SMALLEST TO LARGEST.

(2)

Materials:

Four cards with the numerals 2, 3, 5, and 9 on them



1. Point to the picture. Ask If student responds "NO," do not continue this item.	ARE ALL THE COWS ANIMALS? ③
2. Ask	ARE THERE MORE ANIMALS OR MORE COWS? ④


2+4=

Place 50 beans in front of the student. Point to the problem, say	USE THE BEANS TO FIND THE ANSWER TO THE PROBLEM. ⑤
If the student verbalizes the answer, but does not use the beans, say	NOW SHOW ME HOW TO USE THE BEANS TO FIND THE ANSWER.
If the student uses the beans, but does not verbalize the answer, ask	WHAT IS THE ANSWER?

Materials:

50 beans

1. Say	START AT SIX AND COUNT FOR ME. ⑥
2. If no response or starts at one, say	I WANT YOU TO COUNT LIKE THIS. 6, 7, 8. NOW YOU DO IT. ⑦
3. If the student stops before 15, say	THAT'S FINE. KEEP GOING.
4. If the student counts to 15 or makes 2 consecutive errors, say	THAT'S FINE. YOU MAY STOP NOW.

7 − 3 = □

Place 50 beans in front of the student.

1. Point to the problem. Say

   If the student verbalizes the answer, but does not use the beans or just shows the answer with the beans, say

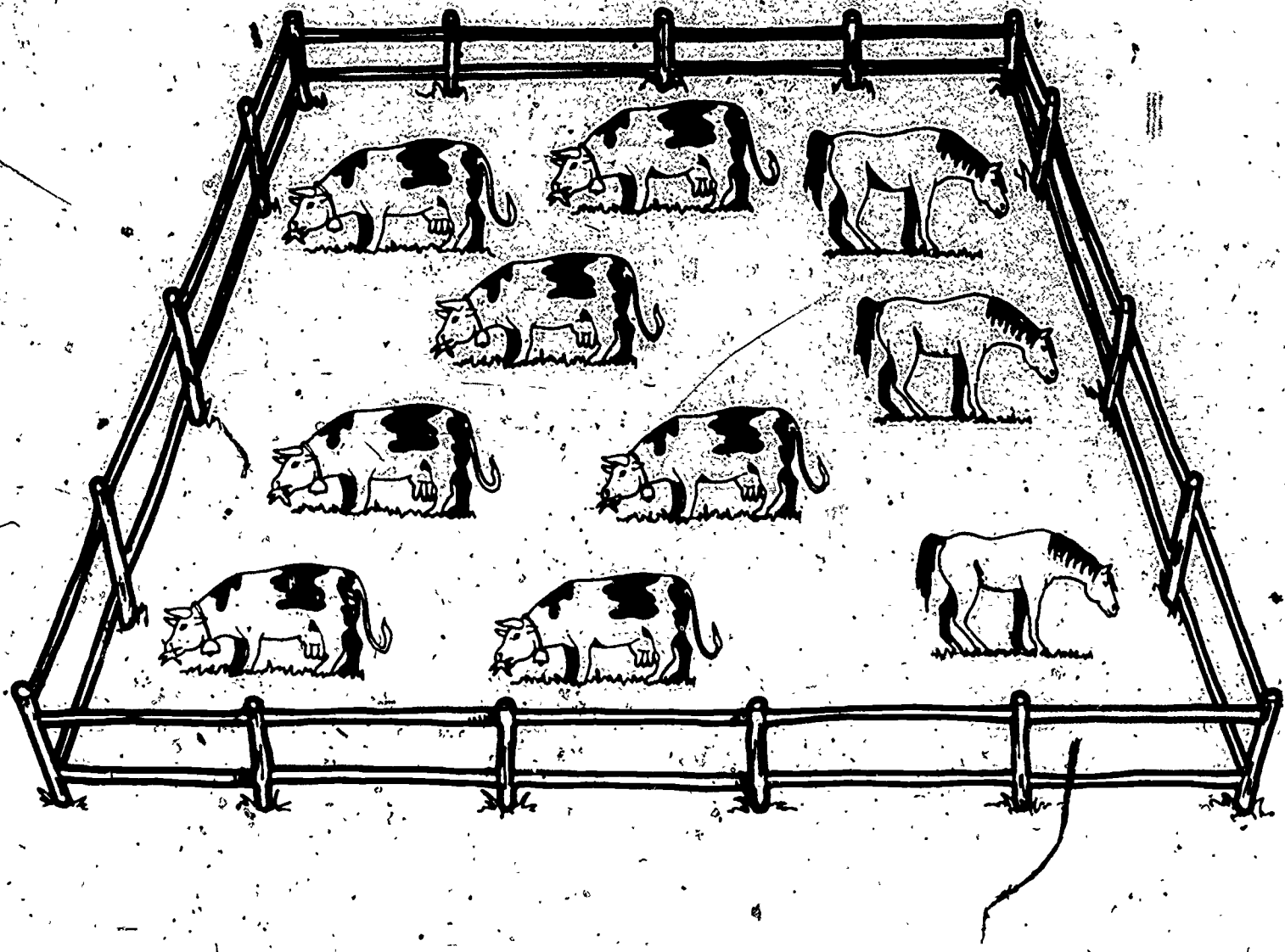
   If the student uses the beans, but does not verbalize the answer, ask

USE THE BEANS TO FIND THE ANSWER. (8)

NOW SHOW ME HOW TO USE THE BEANS TO FIND THE ANSWER.

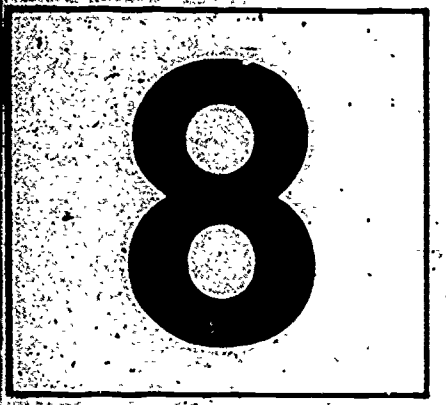
WHAT IS THE ANSWER?

Materials: 50 beans



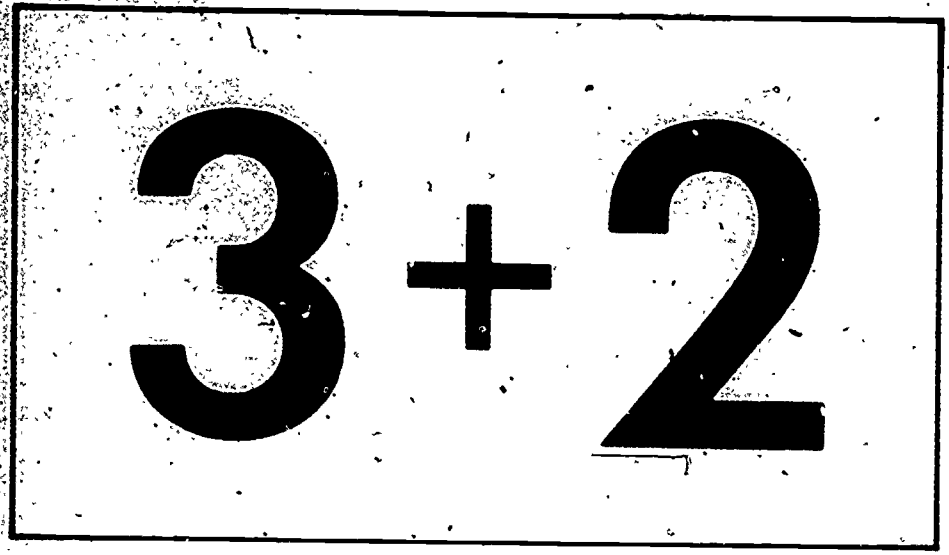
1. Point to the picture. Say	COUNT THE HORSES. (9)
2. Say	COUNT THE COWS. (10)
3. Say	COUNT THE ANIMALS. (11)
4. If the student omits a subset, say	COUNT ALL THE ANIMALS. (12)
5. Ask	ARE THERE MORE ANIMALS OR MORE COWS? (13)

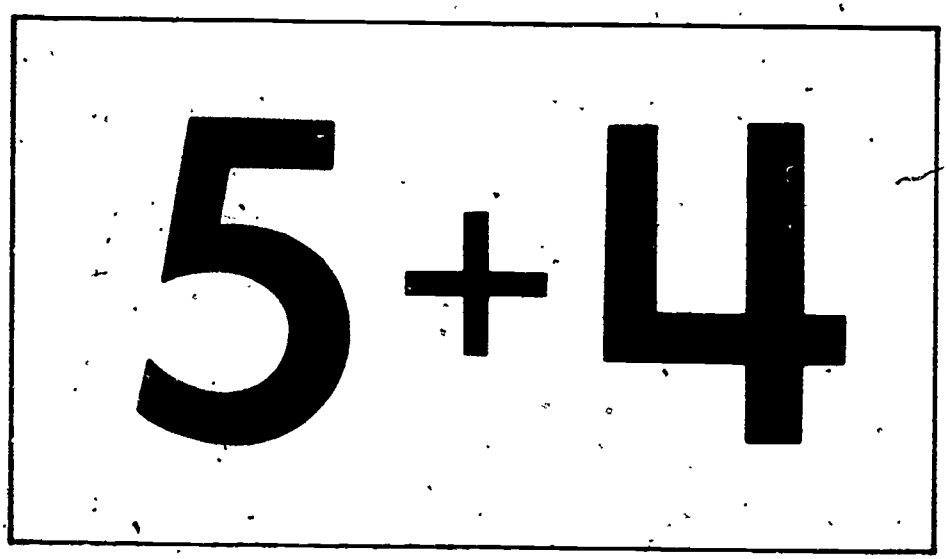
1. Say	START AT 35 AND COUNT FOR ME. (14)
2. If no response or if the student starts at 1, say	I WANT YOU TO COUNT LIKE THIS. THIRTY-FIVE, THIRTY-SIX, THIRTY-SEVEN. NOW YOU DO IT. (15)
3. If the student stops before 46, say	THAT'S FINE. KEEP GOING.
4. If the student counts to 46, or makes 2 consecutive errors, say	THAT'S FINE. YOU MAY STOP NOW.


8


12

1. Point to numerals, ask	WHICH IS MORE? (16)


3+2


5+4

Item 10: Remove this sheet from the test book and cut out along dotted lines.

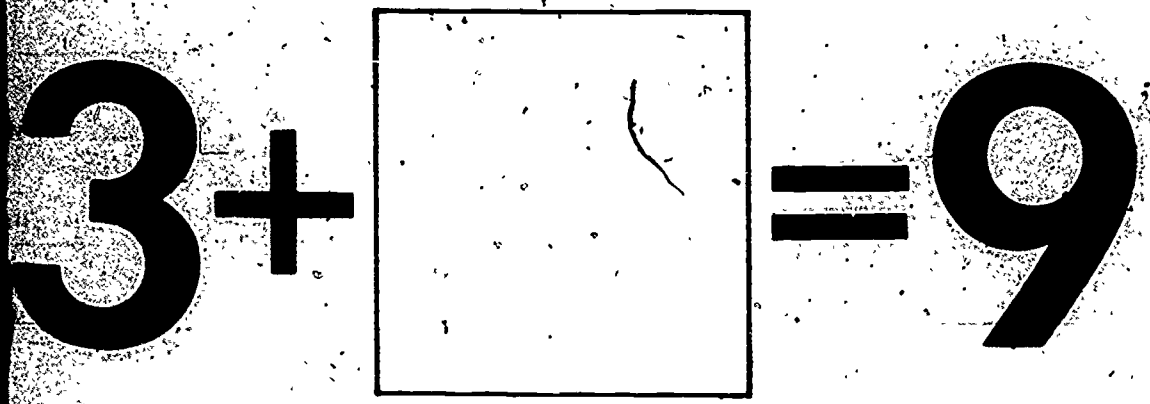
6+3

4+1

6-1

1. Hold up the card with 6 + 3. Say	POINT TO THE CARD WHICH IS THE SAME NUMBER AS THIS. (17)
2. Hold up the card with 4 + 1. Say	POINT TO THE CARD WHICH IS THE SAME NUMBER AS THIS. (18)
3. Hold up the card with 6 - 1. Say	POINT TO THE CARD WHICH IS THE SAME NUMBER AS THIS. (19)

Materials: cards with 6 + 3, 4 + 1, 6 - 1

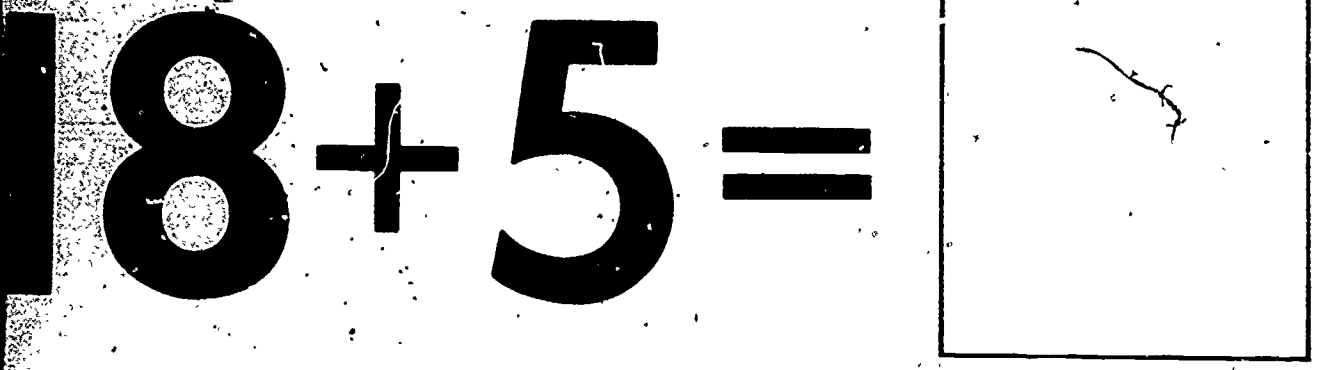

3+
=9

1. Point to box, say

WHAT NUMBER GOES IN THE BOX?

20

1. Say	START AT SIX AND COUNT BACKWARDS FOR ME. (21)
2. If no response, say	I WANT YOU TO COUNT LIKE THIS. 6, 5, 4. NOW YOU DO IT. (22)
3. If the student stops before 1, say	THAT'S FINE. KEEP GOING.
4. If the student counts to 1 or makes 2 consecutive errors, say	THAT'S FINE. YOU MAY STOP NOW.

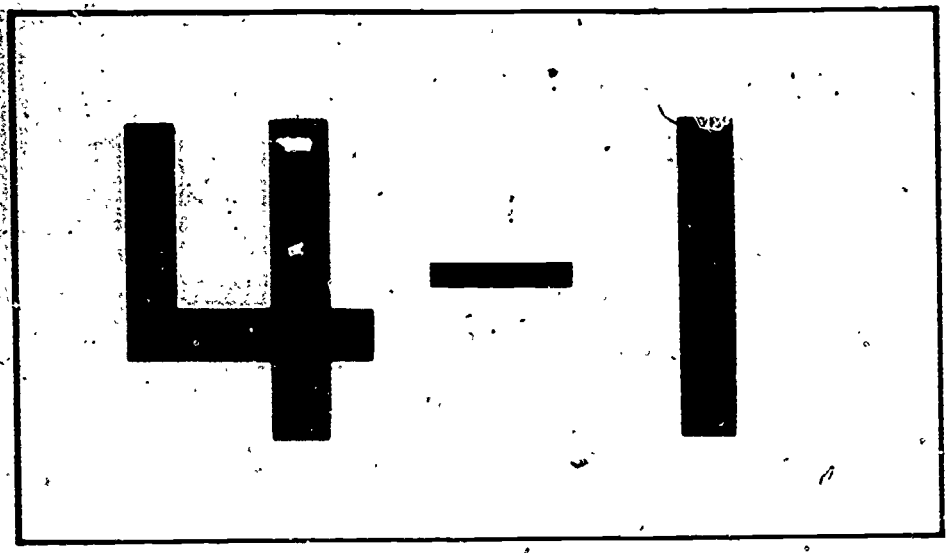

8+5=

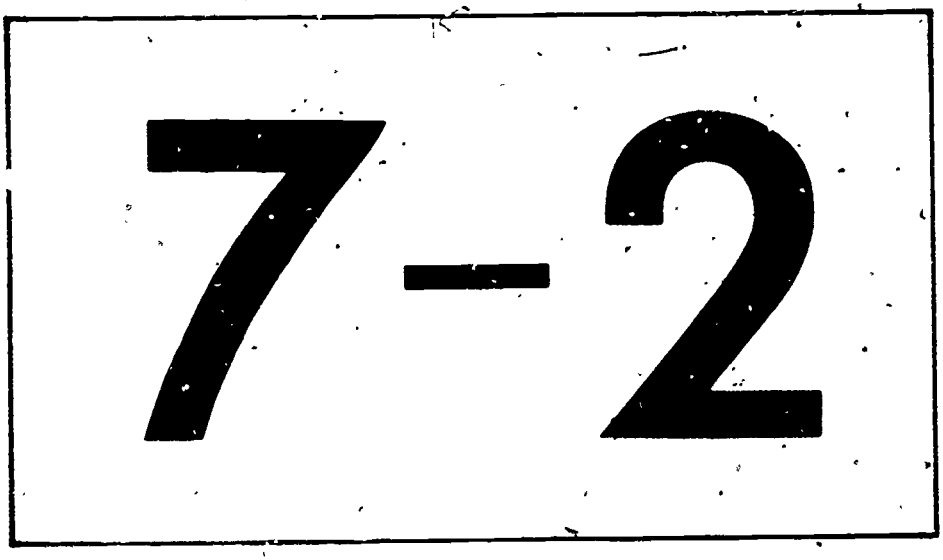
Place 50 beans in front of the student. Point to the problem, say	USE THE BEANS TO FIND THE ANSWER TO THE PROBLEM. (23)
If the student verbalizes the answer, but does not use the beans, say	NOW SHOW ME HOW TO USE THE BEANS TO FIND THE ANSWER.
If the student uses the beans, but does not verbalize the answer, ask	WHAT IS THE ANSWER?

Materials: 50 beans

19 31

1. Point to the numerals. Ask	WHICH IS MORE? (24)


4-1


7-2

Item 15: Remove this sheet from the test book and cut out along dotted lines.

5-2

10-5

4+1

1. Hold up the card with 5 - 2. Say	POINT TO THE CARD WHICH IS THE SAME NUMBER AS THIS. (25)
2. Hold up the card with 10 - 5. Say	POINT TO THE CARD WHICH IS THE SAME NUMBER AS THIS. (26)
3. Hold up the card with 4 + 1. Say	POINT TO THE CARD WHICH IS THE SAME NUMBER AS THIS. (27)

Materials: cards with 5 - 2, 10 - 5, 4 + 1

$$23 - 7 = \square$$

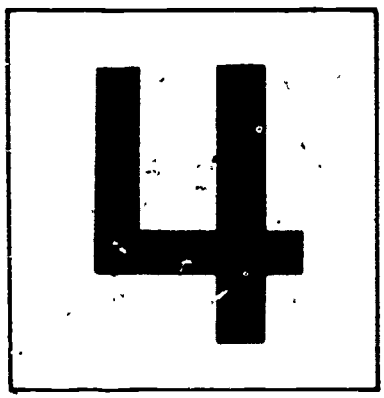
Place 50 beans in front of the student. Point to the problem. Say	USE THE BEANS TO FIND THE ANSWER. (28)
If the student verbalizes the answer but does not use the beans, say	NOW SHOW ME HOW TO USE THE BEANS TO FIND THE ANSWER.
If the student uses the beans but does not verbalize the answer, ask	WHAT IS THE ANSWER?

Materials: 50 beans

153

154

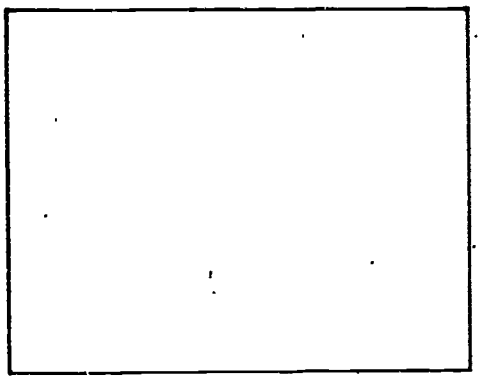
1. Say	START AT 44 AND COUNT BACKWARDS FOR ME. (29)
2. If no response, say	I WANT YOU TO COUNT LIKE THIS. 44, 43, 42. NOW YOU DO IT. (30)
3. If the student stops before 25, say	THAT'S FINE. KEEP GOING.
4. If the student counts to 25 or makes 2 consecutive errors, say	THAT'S FINE. YOU MAY STOP NOW.



1. Point to the numerals. Ask	WHICH IS LESS? (31)

1. Say	COUNT BY TENS FOR ME. (32)
2. If no response or if the student starts at 1, say	I WANT YOU TO COUNT LIKE THIS. TEN, TWENTY, THIRTY. NOW YOU DO IT. (33)
3. If the student stops before 130, say	THAT'S FINE. KEEP GOING.
4. If the student counts to 130, or makes 2 consecutive errors, say	THAT'S FINE. YOU MAY STOP NOW.

$15+9=24$

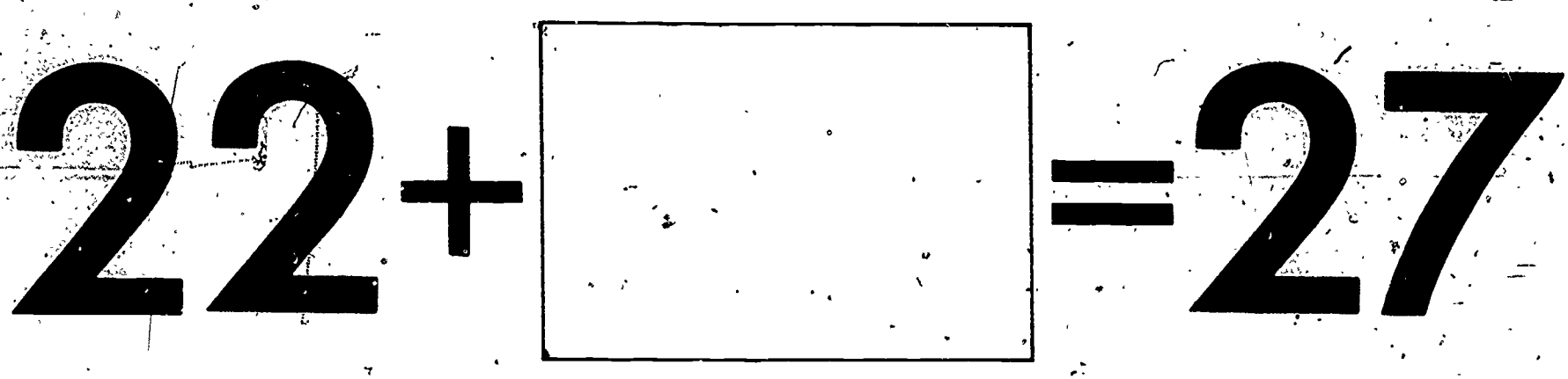
$16+8=$ 

1. Point to the first equation, say If the student can not read the equation, do not continue this item.	READ THIS FOR ME.
2. Point to the second equation, say	TELL ME AS QUICKLY AS YOU CAN WHAT GOES IN THE BOX. (34)
3. Ask	HOW DID YOU GET THAT? (35)

$$56 + 49 = 105$$

$$57 + 48 = \square$$

1. Point to the first equation, say (If the student cannot read the equation, do not continue this item.)	READ THIS FOR ME.
2. Point to the second equation, say	TELL ME AS QUICKLY AS YOU CAN WHAT GOES IN THE BOX. (36)
3. Ask	HOW DID YOU GET THAT? (37)


22+=27

Point to box, say	WHAT NUMBER GOES IN THE BOX? (38)

1. Place 6 bundles of 10 straws each in front of the student in the order TTTTTT. Say	EACH BUNDLE HAS 10 STRAWS. HOW MANY STRAWS ARE THERE? (39)

Materials: 6 bundles of 10 straws each

1. Place 3 bundles of 10 straws each in front of the student. Say	THERE ARE TEN STRAWS IN EACH BUNDLE.
2. Put 7 single straws beside the 3 bundles. Hand the student a piece of paper. Say	WRITE THE NUMBER OF STRAWS. (40)
3. Say	HOW MANY STRAWS ARE THERE? (41)

Materials:

3 bundles of 10 straws each
7 single straws
paper
pencil

34

1. Place 6 bundles of 10 straws each, and 9 single straws in front of the student. Point to the numeral '34'. Say	SHOW ME THIS NUMBER WITH THE STRAWS. (42)

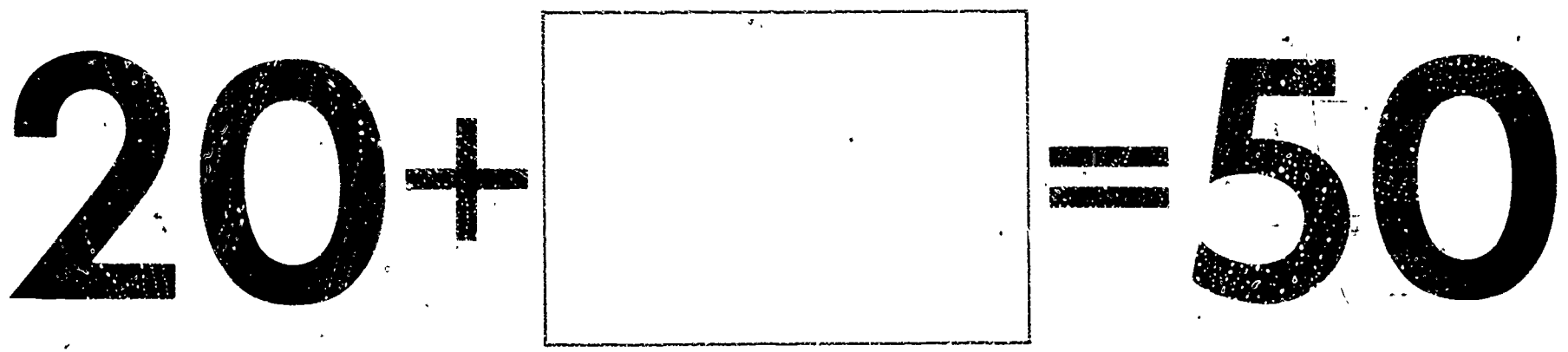
Materials:

6 bundles of 10 straws each
9 single straws

1. Place 6 bundles of 10 straws each and 9 single straws to the student's left and say	SHOW ME FORTY-FIVE STRAWS. (43)

Materials:

6 bundles of 10 straws each
9 single straws


20+
=50

Point to box, say	WHAT NUMBER GOES IN THE BOX? (44)

1. Place a red poker chip in front of the student. Point to it and say Place another red poker chip above the first poker chip ( ). Say Place three (3) more red poker chips in the column ( ). As each chip is placed, say	EACH RED IS TEN. THIS IS TEN. THIS IS TEN.
2. Point to all the chips and ask	HOW MUCH ALL TOGETHER? (45)

Materials: 5 red poker chips

1. Place the paper and pencil to the student's right. Place 4 red poker chips in a column (⁘). Point to each red chip and say	THIS IS TEN, THIS IS TEN, THIS IS TEN, THIS IS TEN.
2. Place a white poker chip starting a second column to the examiner's left of the red chips (° ⁘). Say	EACH WHITE IS ONE.
3. Place 2 more white poker chips in the left column and point to each white chip (⁘). Say	THIS IS ONE, THIS IS ONE.
4. Point to all the chips and say	WRITE HOW MUCH ALL TOGETHER. (46)
5. Ask	HOW MUCH ALL TOGETHER? (47)

Materials: 4 red poker chips
3 white poker chips
paper
pencil

37

1. To the student's right, place a pile of 6 red chips and a pile of 9 white chips, with the red chips closest to the student. Point to the chips and say

   EACH RED IS TEN. EACH WHITE IS ONE.

   Point to the number and say

   SHOW ME THIS NUMBER WITH THE CHIPS. (48)

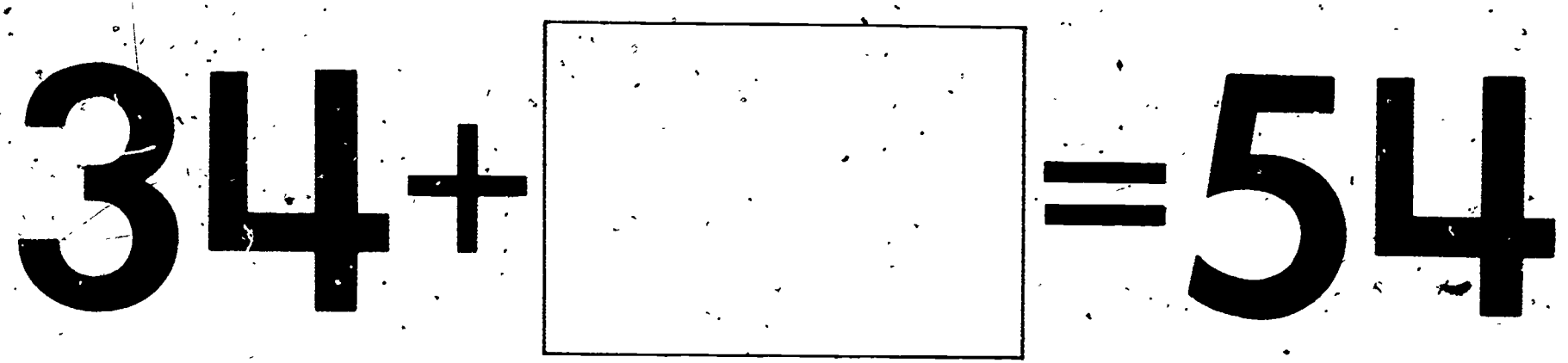
Materials:

6 red poker chips
9 white poker chips

1. To the student's right, place a pile of 6 red chips and a pile of 9 white chips, with the red chips closest to the student. Point to the chips and say	EACH RED IS TEN. EACH WHITE IS ONE.
2. Say	SHOW ME FIFTY-TWO WITH THE CHIPS. (49)

Materials:

6 red poker chips
9 white poker chips


34+
=54

1. Point to box, say	WHAT NUMBER GOES IN THE BOX? (50)

1. Say	START AT 26 AND COUNT BY TENS FOR ME. (51)
2. If no response or if the student counts by 1's, say	I WANT YOU TO COUNT LIKE THIS. TWENTY-SIX, THIRTY-SIX, FORTY-SIX, FIFTY-SIX. (52)
3. If the student stops before 126, say	THAT'S FINE. KEEP GOING.
4. If the student counts to 126, or makes 2 consecutive errors, say	THAT'S FINE. YOU MAY STOP NOW.

PMDC MATHEMATICS TEST
GRADE TWO

EXAMINER'S MANUAL
AND
STATISTICAL DATA

BY

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TESTING PUBLICATION NO. 2

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TALLAHASSEE, FLORIDA
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PMDC Mathematics Test--Grade Two

Examiner's Manual

The PMDC Mathematics Test--Grade Two is an individually administered test designed to assess students' attainment of concepts and skills related to the following topics: Counting, Patterns, Place Value, Equivalent Number Names, Ordering of Numbers, Addition and Subtraction, Missing Addends, and Class Inclusion. This test does not include conventional paper-pencil items. Directions are given orally, and the student responds orally and/or by demonstrating the solution to a problem with manipulative aids. The items within the test are organized from easy to hard, and combine several content strands within each difficulty level.

The PMDC Mathematics Test--Grade Two is administered in accordance with instructions incorporated with the test items. The purpose of this manual is to provide additional guidelines to insure that all students experience as nearly as possible the same testing situation. This Examiner's Manual is organized into the following eight parts:

Part I: Description Of Test Materials
Part II: Preparation For Administration
Part III: Meeting the Student and Introducing the Test
Part IV: Administering the Test
Part V: Recording Student Responses
Part VI: Completion of Testing
Part VII: Statistical Data On PMDC Mathematics Test--Grade Two
Part VIII: Student Response Form and Student Profile Sheet

Part I: DESCRIPTION OF TEST MATERIALS

A. Test Book

The test items and directions make up a loose-leaf notebook interior. When opened and placed on a stand (large metal bookend), the notebook forms an easel which presents the material to the student and at the same time provides the examiner with instructions, test items, lists of manipulatives and pictures needed, and the numerical key to the Student Response Form.

B. Student Response Form

1. Description

A student's response to an item is recorded on the Student Response Form. A copy of this form is included in the test book, immediately following the title page, and in Part VIII of this manual. Each test question is numerically keyed to a box on the Student Response Form. To the right of each test question is an encircled number. This number corresponds to a box with the same number on the Student Response Form. At the bottom of the Student Response Form is a space in which the examiner can note additional information about the student's responses or the student's behavior during the test.

2. Format

The response boxes are arranged sequentially from left to right across the Student Response Form by rows. For example, on the grade 2 Student Response Form, boxes 1 to 8 appear from left to right in row 1 and boxes 9 to 20 appear from left to right in row 2.

More than one box for one test item may be placed together (for example, boxes 3 and 4 in the Grade Two test.) This means that two or more questions belong with a single test item. There is a separate box for each question.

Each box is comprised of either one or two columns. Generally the first (or only) column is for recording the student's response. This column is usually titled RESPONSE, but may be assigned a more descriptive title such as WRITTEN or VERBAL. Within this column, likely responses are listed, such as no attempt, the correct response (indicated by parentheses), and in a few cases other common responses. The blank area at the bottom of the column is for recording other than the specified responses. The second column is for recording the student's errors and/or the method used in responding to the question. Listed are the more probable errors or methods. The alternative, OTHER, is circled when the student makes an error or uses a method not listed. The examiner may elaborate on the error or method in the COMMENTS section of the Student Response Form.

C. Manipulatives and Pictures

The administration of the test requires a set of manipulatives and pictures in addition to the pictures contained in the test book. The materials specified in the table below should be collected prior to testing. On each item page is a list of materials which are needed for that item.

GRADE TWO TEST: MATERIALS

Materials	Items
50 beans	4, 6, 13, 16
*Card with 2, 3, 5 and 9	2
*Card with 6+3, 4+1, and 6-1	10
*Card with 5-2, 10-5, and 4+1	15
6 bundles of 10 straws and 9 single straws	23, 24, 25, 26
6 red chips and 9 white chips	28, 29, 30, 31
Paper and pencil	24, 29

*Included in the test book.

D. Student Profile Sheet

The Student Profile Sheet is used for summarizing the students' responses by content scales. A copy of this form is included in Part VIII of this Examiner's Manual. Instructions for completing this form are discussed below (Part VI: Completion of Testing).

Part II. PREPARATION FOR ADMINISTRATION

A. Instructions

The examiner must become familiar with the guidelines detailed in this manual. Since the PMOC Mathematics Test--Grade Two is administered from instructions incorporated with the test items, the examiner should practice giving the test prior to testing students. The examiner should also become familiar with the organization of the Student Response Form.

B. Seating

To allow the examiner to view both sides of the test book, and shield the Student Response Form from the student, a right-handed examiner should seat the student on her/his left: S[ ]E and a left-handed examiner should seat the student on her/his

right: [E] S

C. Materials

- Be sure that all materials (Test Book, Student Response Form, manipulatives and pictures) are collected prior to the administration of the test.
- Place the manipulatives and pictures so that they are accessible to the examiner and shielded from the student. On each item page is a list of the manipulatives and/or pictures which accompany the item.

Part III. MEETING THE STUDENT AND INTRODUCING THE TEST

Attempt to put the student at ease. One way to do this is to talk with the student for a brief time about things unrelated to the test. The following sequence will help to minimize the student's anxiety about the testing situation.

A. Introduce yourself to the student.

HELLO, MY NAME IS . . .

B. Ask the student her/his full name if you do not know it.

WHAT IS YOUR FIRST NAME? WHAT IS YOUR LAST NAME?

Fill in the blank on the Student Response Form for the STUDENT'S NAME.

C. Spend approximately 30 seconds in social conversation. Suggested leading questions are:

DO YOU HAVE ANY BROTHERS OR SISTERS?

DO YOU HAVE ANY PETS?

HOW OLD ARE YOU? WHEN IS YOUR BIRTHDAY?

WHO IS YOUR TEACHER?

D. Introduce the Test

Do NOT refer to the PMDC Test as a test or a game. There are two main points you need to convey. The suggested dialogue is:

WE ARE GOING TO LOOK AT A BOOK WHICH CONTAINS SOME INTERESTING PICTURES AND QUESTIONS.

(pause)

I'LL ASK YOU SOME QUESTIONS ABOUT THE PICTURES. YOU ANSWER THEM. IF I ASK YOU ABOUT SOMETHING YOU HAVEN'T LEARNED, JUST TELL ME YOU DON'T KNOW AND I'LL SHOW YOU ANOTHER PICTURE, O.K.?

Part IV. ADMINISTERING THE TEST

Remember, this is an evaluation and should not be used as a teaching situation.

A. Follow the written directions carefully. The examiner may probe to get an answer with the statement "Tell me more." Do not probe any further, except when specified in the written directions for the question. For some items a second or probing question is incorporated with the test directions. The second question should be asked when the student does not attempt to answer the initial question or when the student's response to the initial question indicates that the student did not understand the meaning of that question.

B. Address questions and comments to the student, not the book or the response form. Eye contact is important for control and rapport. Reassure the student without specifying that responses are right or wrong. This may be done in a variety of ways.

1. Repeat what the student has said in a reassuring voice.
2. Remarks should be positive and limited to "Um-hum," "All right," "Fine," and "O.K."
3. Physical expressions should be positive and limited to a smile and a nod of

the head.

C. To regain a student's attention, the examiner may precede the question with "O.K.," the student's name, and/or "Now, here are some more interesting pictures and questions."

D. If a student does not understand the question, repeat the written question only. Remember, rephrasing a question would violate the standardization of the administration.

E. Time Limits

If a student does not respond after 15 seconds, point to the item and ask,

DO YOU KNOW HOW TO DO THIS?

If the student says "Yes," allow 10 more seconds for a response. If the student says "No," or does not respond after the additional 10 seconds, proceed to the next item saying,

LET'S DO SOMETHING ELSE.

Part V. RECORDING STUDENT RESPONSES

Record student responses by CIRCLING the appropriate alternative in the appropriate space on the Student Response Form.

A. RESPONSE column

This column is generally titled RESPONSE, but may be assigned a more descriptive title such as Written or Verbal.

1. If a student says he does not know the answer or does not respond at all, CIRCLE the alternative NO ATTEMPT.
2. If a student responds correctly, CIRCLE the alternative which is enclosed in parentheses.
3. If a student responds incorrectly and that response is listed as an alternative, CIRCLE the alternative.
4. If a student responds incorrectly, and that response is not listed, WRITE BRIEFLY the response in the blank space.

B. ERROR column

This column is used for the oral counting items. As noted in the test instructions, the examiner terminates the counting process when the student makes two errors.

1. If a student omits one number while counting, for example, 37, 38, 39, 41, CIRCLE the alternative SKIP NUMBER.
2. If a student orders two numbers incorrectly while counting, for example, 37, 38, 39, 41, 40, CIRCLE the alternative INCORRECT ORDER.
3. If a student counts incorrectly in a manner other than omitting one number or ordering two numbers incorrectly, CIRCLE the alternative OTHER.

C. METHOD column

This column is used for collecting information about the methods students use to solve the problems presented. Circle the alternative that best applies to the nature of the student's response. Two alternatives which are common to most of the Method Columns are Immediate and Other.

1) Immediate. If a student responds to a question or statement within 3 seconds and it is difficult to discern the method or process used, circle Immediate.

2) Other. If a student responds to a question or statement in a manner not described by the list of alternatives, circle Other. The examiner may want to elaborate on the Other method or procedure used. To avoid a situation in which the student would be forced to wait, with no interaction, jot a

brief note beside Other as a reminder and wait until the testing is complete before elaborating. After testing, describe the method or procedure in the Comments section of the Student Response Form using the numerical key to identify the item.

D. Discussion of Methods

The student may use one of several strategies in responding to questions related to using manipulatives to solve addition or subtraction problems. For example, in response to item 4 question 5 ("Use the beans to find the answer: 2 + 4 = □") the student may count two beans, four beans, and then count the six beans. This method would be recorded by circling the alternative: Counted 2, 4, then 6. Other students may exhibit evidence of counting-on and respond by counting four beans and then counting two more beans as: 5, 6. This method would be described by the alternative: Counted-On. If the student uses a combination of the above methods or a completely different method, the alternative Other should be circled and the method described in the Comments section.

E. Comments section

Immediately after the administration of the test is completed, the examiner should note in the Comments section any behavior of the student which might have affected the student's responses. For example, it should be noted if the student became tired during the administration of the test, was not at ease during the test, gave impulsive responses without giving thought to the questions, exhibited a short attention span, or did not understand the examiner.

Part VI. COMPLETION OF TESTING

Thank the student for participating. If the testing situation is one in which more than one student is being tested in the same room and the testing of other children is not complete, talk quietly with the student until all testing is completed. Talking around, game playing, or loud talking may disturb the testing of the other student(s).

Information from the Student Response Form should be transferred to the Student Profile Sheet. The Student Profile Sheet provides a summary of right/wrong responses by content scales. In transferring the data from the Student Response Form to the Student Profile Sheet, make a check in the Yes column if the student gave a correct response to either the initial question or the the second question for a given item.

In scoring counting questions on which the student made only one error (for example, in counting from 35 the student omits 39) count the response as correct and note the skipped number in the Comments column. Methods used by the student in responding to a question should also be noted in the Comments column. If it was necessary to ask the second question, note this by circling the number in the Item Number column. This information will provide an indication of the student's understanding of the directions for the item.

Incorrect responses are recorded on the Student Profile Sheet by making a check in the No column. Observations of the student's errors and the methods used should also be recorded. In recording responses to counting questions where the student only partially completes the task, check No and indicate in the Comments column how far he counted.

Question 3 on the Student Response Form is not transferred to the Student Profile Sheet. This question, therefore, is not counted in the computation of a student's raw score. The maximum score on the PMDC Mathematics Test--Grade Two is 42. This score takes into account the use of alternative questions on some items.

Part VII. STATISTICAL DATA ON PMDC MATHEMATICS TEST--GRADE TWO

The PMDC Mathematics Test--Grade Two was administered to 158 entering first graders students, 81 boys and 77 girls, during the first three weeks of September, 1975. Students in this sample were attending one of five elementary schools. Two schools were located in Tallahassee, Florida, and the other three schools in Athens, Georgia. The schools were quite varied in their composition in terms of socioeconomic variables: race, parental education, family income, parental occupation.

The students in the sample population were also given the Otis-Lennon Mental Ability Test and the KeyMath Diagnostic Arithmetic Test. The mean IQ for the sample was 105, with a standard deviation of 19. The IQ measures ranged from a low of 62 to a high of 150. The mean raw score on the KeyMath Test was 69 (grade equivalent of 2 years, 3 months), with a standard deviation of 22. The raw scores ranged from a low of 25 to a high of 134.

The maximum score on the PMDC grade two test is 42. The test questions used in obtaining a total score are sub-divided into nine scales: Elementary Counting, Advanced Counting, Patterns, Place Value, Equivalent Number Names, Addition and Subtraction, Missing Addends, Ordering Numbers, and Class Inclusion. A summary of the descriptive statistics for the total test and for each scale is given in the table below:

PMDC Mathematics Test--Grade Two
Statistical Data

Scale	Number Questions	Mean	Standard Deviation	Reliability
Elementary Counting	7	6.1	1.1	0.47
Advanced Counting	5	2.3	1.9	0.82
Patterns	2	0.5	0.7	*
Place Value	8	3.7	3.4	0.95
Equivalent Number Names	6	2.3	2.3	0.88
Addition and Subtraction	4	2.6	1.2	0.60
Missing Addends	4	1.0	1.2	0.68
Ordering Numbers	4	3.0	1.0	0.47
Class Inclusion	2	0.7	0.8	*
Total Test	42	22.4	9.8	0.94

*Could not be computed due to the small number of items

The questions associated with each scale are identified on the Student Profile Sheet. The reliability coefficients listed in the table are Cronbach alphas and provide a measure of the internal consistency of the scales. The Spearman-Brown split halves formula was also used to compute reliability on the total test and yielded a coefficient of 0.93.

Correlations among the students' performances on the PMDC, KeyMath and Otis-Lennon tests are given below:

Correlation between PMDC and KeyMath measures 0.82
Correlation between PMDC and Otis-Lennon measures 0.68
Correlation between KeyMath and Otis-Lennon measures 0.78

Part VIII: STUDENT RESPONSE FORM AND STUDENT PROFILE SHEET

The Student Response Form and the Student Profile Sheet are included in this Examiner's Manual. One copy of each form is needed for each student tested. These forms may be reproduced without requesting permission from PMDC.

PMDC ARITHMETIC TEST, GRADE 2

STUDENT RESPONSE FORM

STUDENT'S NAME _____ DATE _____

STUDENT'S ID # _____ EXAMINER _____

1

Response	Method
No Attempt (13)	Immediate Counting–touch Counting–visual Other

2

Response
No Attempt (2-3 5-9) 9 5-3 2 Other

3

Response
No Attempt (Yes) No

4

Response
No Attempt (Animals) Cows Neither/Same Other

5

Response	Method
No Attempt (6) Without beans	Counted On Counted 2, 4, then 6 Other

6

Response	Errors
No Attempt (Correct) ___ to ___	Skip Number Incorrect Order Other

7

Response	Errors
No Attempt (Correct) ___ to ___	Skip Number Incorrect Order Other

8

Response	Method
No Attempt (4) Without beans	Counted Back Counted 7, 3, then 4 Other

9

Horses
No Attempt (3)

10

Cows
No Attempt (7)

11

Animals
No Attempt (10)

12

Repeat All
No Attempt (10)

13

Response
No Attempt (Animals) Cows Other

14

Response	Errors
No Attempt (Correct) ___ to ___	Skip Number Incorrect Order Other

15

Response	Errors
No Attempt (Correct) ___ to ___	Skip Number Incorrect Order Other

16

Response
No Attempt (12)

17

Response
No Attempt (5 + 4)

18

Response
No Attempt (3 + 2)

19

Response
No Attempt (3 + 2)

20

Response	Method
No Attempt (6)	Immediate Subtracted Counted On Other

21

Response	Errors
No Attempt (Correct) ___ to ___	Skip Number Incorrect Order Other

22

Response	Errors
No Attempt (Correct) ___ to ___	Skip Number Incorrect Order Other

23

Response	Method
No Attempt (23) Without beans	Counted On Counted 18, 5 then 23 Other

24

Response
No Attempt (31)

25

Response
No Attempt (4 1)

26

Response
No Attempt (7 - 2)

27

Response
No Attempt (7 2)

28

Response	Method
No Attempt (16) Without Beans	Counted Back Counted 23, 7, then 16 Addition Other

29

Response	Errors
No Attempt (Correct) ___ to ___	Skip Number Incorrect Order Other

30

Response	Errors
No Attempt (Correct) ___ to ___	Skip Number Incorrect Order Other

31

Response
No Attempt (4)

32

Response	Errors
No Attempt (Correct) ___ to ___	Skip Number Incorrect Order Other

33

Response	Errors
No Attempt (Correct) ___ to ___	Skip Number Incorrect Order Other

34

Response
No Attempt (24)

35

Method
No Attempt Added Pattern Guessed Other

36

Response
No Attempt (105)

37

Method
No Attempt Added Pattern Guessed Other

38

Response	Method
No Attempt (5)	Immediate Subtracted Counted On Other

39

Response	Method
No Attempt (60)	Immediate Counts by Tens Counts by Ones Other

40

Written
No Attempt (37)

41

Verbal	Method	
No Attempt (37)	Immediate	
	10 20 30 31 32	37
	30 31 32	37
	1 2 3 4	37
	1 2 3 4	10
	10 11 12	19
	Other	

42

Response	Method
No Attempt (34)	Counted by Tens and Ones Counted by Ones Other

43

Response	Method
No Attempt (45)	Counted by Tens and Ones Counted by Ones Other

44

Response	Method
No Attempt (30)	Immediate Subtracted Counted On Other

45

Response	Method
No Attempt (50)	Immediate Counted by Tens Counted by Ones Other

46

Written
No Attempt (43)

47

Verbal	Method	
No Attempt (43)	Immediate	
	10 20 30 40 41 42 43	43
	40 41	43
	1 2 3	7
	1 2	16
	10 11 12	
	Other	

48

Response	Method
No Attempt (27)	Counted by Tens and Ones Counted by Ones Other

49

Response	Method
No Attempt (52)	Counted by Tens and Ones Counted by Ones Other

50

Response	Method
No Attempt (20)	Immediate Subtracted Counted On Other

51

Response	Errors
No Attempt (Correct) ___ to ___	Skip Number Incorrect Order Other

52

Response	Errors
No Attempt (Correct) ___ to ___	Skip Number Incorrect Order Other

Test Behavior _____

Comments _____

PMDC ARITHMETIC TEST, GRADE 2

STUDENT'S NAME _____

STUDENT PROFILE SHEET

STUDENT'S ID NUMBER _____

	Item Response Number	TASK	YES	NO	COMMENTS
Elementary Counting	1	Count a picture set of dots (13)			
	6 or 7	Count from 6 to 15			
	9	Count a picture set of horses (3)			
	10	Count a picture set of cows (7)			
	11 or 12	Count a picture set of animals (10)			
	14 or 15	Count from 35 to 46			
	21 or 22	Count back from 6 to 1			
Advanced Counting	29 or 30	Count back from 44 to 25			
	32 or 33	Count by tens from 10 to 130			
	39	Determine the number of a set represented by 6 bundles of ten straws			
	45	Determine the number of a set represented by 3 red chips, each red chip stands for ten			
	51 or 52	Count by tens from 26 to 126			
Place Value	40	Write the numeral for a set represented by 3 bundles of ten straws and 7 single straws			
	41	Tell the number of a set represented by 3 bundles of ten straws and 7 single straws			
	42	Construct a set using bundles of ten straws and single straws corresponding to a written numeral (34)			
	43	Construct a set using bundles of ten straws and single straws, with a given number of members (45), in response to oral directions			
	46	Write the numeral for a set represented by 5 red chips (each stands for 10) and 3 white chips (each stands for 1)			
	47	Tell the number of a set represented by 5 red chips (each stands for 10) and 3 white chips (each stands for 1)			
	48	Construct a set using red chips (10 each) and white chips (1 each) corresponding to a written numeral (37)			
	49	Construct a set using red chips (10 each) and white chips (1 each) to represent a given number (52), in response to oral directions			
Equivalent Names	5	Use counters (beans) to solve an addition problem, sum 6			
	8	Use counters (beans) to solve a subtraction problem, minuend 7			
	23	Use counters (beans) to solve a addition problem, 2-digit (18) plus 1-digit (5)			
	28	Use counters (beans) to solve a subtraction problem, 2-digit (23) minus 1-digit (7)			
Ordering Numbers	20	Solve a written missing addend problem, sum 9			
	38	Solve a written missing addend problem, sum 27			
	44	Solve a written missing addend problem, involving multiples of 10 only			
	50	Solve a written missing addend problem, answer a multiple of ten (30)			
Inverses/ Reversibility	34 & 35	Solve (without computation) an addition problem by using a related equation, 2-digit sum (24)			
	36 & 37	Solve (without computation) an addition problem by using a related equation, 3-digit sum (105)			
Missing Addends	2	Order four numbers (2, 3, 5 and 9) from smallest to largest			
	16	Tell which of two numbers (8 and 12) is more			
	24	Tell which of two numbers (19 and 31) is more			
	31	Tell which of two numbers (7 and 4) is less			
Patterns	17	Identify names for the same number (6+3 and 5+4)			
	18	Identify names for the same number (4+1 and 3+2)			
	19	Identify names for the same number (6-1 and 3+2)			
	25	Identify names for the same number (5-2 and 4-1)			
	26	Identify names for the same number (10-5 and 7-2)			
	27	Identify names for the same number (4+1 and 7-2)			
Set Inclusion	4	Answer a class inclusion question, without explicit directions to count the members of sets (numbers 10 or less)			
	13	Answer a class inclusion question, after having counted the members in each set (numbers 10 or less)			